PRELIMINARY
STORMWATER MANAGEMENT PLAN
FOR
SANTANA TERRACE
CITY OF SANTA CLARA, CALIFORNIA

Job Number 17271-B

June 22, 2015

RICK ENGINEERING COMPANY

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CITY OF SANTA CLARA, CALIFORNIA

Job Number 17271-B

REGISTERED PROFESSIONAL ENGINEER
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Table of Contents

List of Appendices

1.0 INTRODUCTION

This preliminary storm water management plan (SWMP) summarizes storm water protection requirements for the Santana Terrace project. The project is located at 100 North Winchester Boulevard, in the City of Santa Clara, California. Please refer to Figure 1: Vicinity Map on the following page. This report has been prepared in conjunction with a preliminary drainage study report, titled "Preliminary Drainage Study for Santana Terrace," dated June 22, 2015, which includes more details regarding drainage characteristics, such as drainage areas and design flows.

The development consists of two senior apartment buildings consisting of 92 units with approximately 140,000 square feet of gross floor area, a pool and maintenance building, parking, walkways, landscaped areas, as well as a pool and spa, on approximately 1.86 acres. In the pre-project condition the site consists of one three story commercial office building reported to contain approximately 65,000 square feet of floor area, extensive paving areas, and landscaped areas. The existing site employs no permanent stormwater control measures. The existing project site is approximately 89.2 percent impervious and the proposed project results in a slight reduction of impervious area at 89.0 percent impervious.

This SWMP describes the permanent storm water control measures that will be incorporated into the project in order to mitigate the impacts of pollutants in storm water runoff from the proposed project. For the purposes of post-construction storm water quality management, the project will follow the guidelines and requirements set forth in the "Santa Clara Valley Urban Runoff Pollution Prevention Program – C.3 Stormwater Handbook," dated April 2012 (herein "Storm Water Standards") adopted by the City of Santa Clara.

1.1 Drainage Characteristics

In the pre-project condition, the lot is fully developed with an office building, parking, and landscaped areas. Drainage is conveyed through an on-site storm drain system to the southeast corner of the property and into an existing storm drain system within North Winchester Boulevard. The existing storm drain system flows south to north and ultimately discharges to San Tomas Aquino Creek.

In general the post-project drainage condition will remain similar to the pre-project condition drainage characteristics. Runoff from the site will be routed through a network of proposed biotreatment basins and a proposed storm drain system to the existing connection to the storm drain system in North Winchester Boulevard.

The following sections of this SWMP describe the permanent storm water control measures to be implemented for the project as well as hydromodification management requirements (Section 2.0), and the operation and maintenance plan for permanent storm water control measures (Section 3.0).

Figure 1: Vicinity Map

2.0 PERMANENT STORMWATER CONTROL MEASURES

The following discussion addresses requirements of Provision C.3 of the Bay Area Municipal Regional Stormwater Permit (MRP), to establish permanent stormwater control measures. Projects subject to Provision C.3 requirements shall implement all applicable site design, source control, treatment systems, and hydromodification management measures described in the Storm Water Standards. Appendices 1 through 3 include the required Provision C.3 Data Form, the Infiltration/harvesting and Use Feasibility Screening Worksheet, and the Stormwater Treatment Sizing Requirements Worksheets respectively.

Sections 2.1 through 2.4 of this SWMP will discuss the permanent storm water control measures proposed for the project.

2.1 Site Design Measures

The term "site design measures" refers to land use or site planning practices that are used in design to reduce the project's impact on water quality and beneficial uses. Utilizing site design measures in a project can help reduce the size of the required treatment measures. The following text discusses the site design measures used in respect to the Santana Terrace project.

1. *Cluster structures/pavement and Minimize impervious surfaces:*
    - The buildings and sidewalks were clustered together to allow for landscaped areas where possible.
    - The proposed buildings were placed to one side of the site and a hammerhead for fire truck access was added to the site to reduce the amount of paving required for fire department access.
    - The building footprints were minimized by using a multiple story building.
    - Portions of the buildings roofs will be used for recreation areas to allow more landscaped areas on the ground.
    - The majority of the buildings parking was located in a parking garage within the buildings footprint.
2. *Minimize land disturbed*

- Where possible, healthy existing trees were preserved on-site.

3. *Disconnected downspouts*
   - None of the downspouts from the proposed buildings flow directly into the proposed storm drain system. All of the roof drainage will flow through biotreatment areas prior to entering the storm drain system.

2.2 Source Control Measures

The term "source control measures" refers to land use or site planning practices, or structures that aim to prevent urban runoff pollution by reducing the potential for contamination at the source of pollution. Source control measures minimize the contact between pollutants and urban runoff. The following text discusses the source control measures used in respect to the Santana Terrace project.

1. *Covered dumpster area, drain to sanitary sewer:*
   - All of the trash collection areas for the proposed site will be contained within the building footprint.
2. *Sanitary sewer connection or accessible cleanout for swimming pool/spa/fountain:*
   - The swimming pool and spa in the proposed site will drain to the sanitary sewer system.
3. *Beneficial Landscaping (minimize irrigation, runoff, pesticides and fertilizers; promotes treatment):*
   - The site will include no drain inlets draining directly to the proposed storm drain system except where they are located within a biotreatment area and set a minimum of six inches above the treatment area ground surface to allow runoff from irrigation, potentially carrying pesticides and fertilizers, to be treated prior to entering the storm drain system.
   - In addition, the landscaping systems will be designed to include the following features:
     i. Rain shutoff devices will be used to prevent irrigation during and after precipitation events.

ii. Irrigation contribution to dry-weather runoff will be reduced by avoiding spray irrigation patterns where overspray to paved surfaces or drain inlets could occur.

iii. Avoiding overwatering and potential irrigation runoff by designing the irrigation systems to each landscape area's specific water requirements.

iv. Flow reducers or shutoff valves that are triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines will be implemented.

- Integrated Pest Management (IPM) principles will be employed on site following these general guidelines:
  - Integrated pest management (IPM) is an ecosystem-based pollution prevention strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as:
    1. Biological Control
    2. Habitat Manipulation
    3. Use of resistant plant varieties

    Pesticides are used only after monitoring indicates they are needed according to established guidelines. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the surrounding environment. More information regarding pesticide application may be obtained at the following University of California-Davis website: http://www.ipm.cdavis.edu/WATER/U/index.html.

  - To eliminate or reduce the need for pesticide use, the following strategies can be used:
    1. Plant pest-resistant or well-adapted plant varieties
    2. Discourage pests by modifying the site and landscape design

  - IPM educational materials should be distributed to future site residents and tenants. These materials should address the following:
    1. Use of barriers, screens, and caulking to keep pests out of buildings and landscaping
    2. Physical pest elimination techniques, such as weeding, washing, or trapping pests

3. Relying on natural enemies to eliminate pests
4. Proper use of pesticides as a last line of defense

4. *Maintenance (pavement sweeping, catch basin cleaning, good housekeeping)*
    - The site and storm drain system will be maintained as required by the operations and maintenance plan.
5. *Storm drain labeling:*
    - Concrete stamping, or other storm drain labeling, will be provided for catch basins and any inlets located within the project site.

2.3 Treatment Systems

The term low impact development (LID) means a storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. The following text discusses the low impact development treatment systems that will be employed in the Santana Terrace project.

1. *Bioretention areas:*
    - Bioretention areas function as soil and plant-based filtration measures that remove pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a ponding area, a mulch layer, plants, and biotreatment soil mix, underlain by drain rock and an underdrain (if required). Bioretention areas are designed to distribute stormwater runoff evenly across the surface ponding area. Water stored in the ponding area percolates through the biotreatment soil mix to the drain rock layer and then either infiltrates into native soil or flows out through the underdrain to the storm drain system.

      Bioretention areas can be any shape, including linear. Bioretention areas with underdrains should be designed to maximize infiltration to native soils by placing the underdrain near the top of the drain rock layer unless infiltration is not permitted due to site conditions (e.g., high groundwater table, steep slopes, proximity to structures, presence of contaminated soil or groundwater, etc.). Bioretention areas without underdrains are sometimes referred to as "bioinflltration" measures. All bioretention areas should include an overflow/bypass system to convey runoff volumes that are greater than the water quality design volume.

2. *Flow-through planters:*
   - Flow through planters function similarly to bioretention areas where infiltration is not allowed. They are a type of biotreatment facility that is completely lined and surrounded with concrete or other structural planter box walls with waterproof membranes. They can be used next to buildings and other locations where moisture is a potential concern. Flow-through planters typically receive runoff via downspouts leading from roofs or adjacent buildings. Pollutants are removed as the runoff passes through the biotreatment soil mix and is collected in an underlying drain rock layer and perforated underdrain. The underdrain must be directed to a storm drain or other discharge point. An overflow inlet conveys flows that exceed the capacity of the planter.

Due to the presence of hydrologic Type C clayey soils onsite with a high potential for shrinkage and swelling it has been determined that an impermeable liner and underdrain will be used for all of the treatment facilities on site. Because of the addition of the underdrain, the treatment facilities for this site will be referred to as biotreatment facilities. Please see the excerpts from the Geotechnical Report and the NRCS soils report included in Appendix 4.

2.3.1 Numeric Sizing Requirements for the Biotreatment Areas

The biotreatment basins for the Santana Terrace project have been sized using the combined flow and volume design basis specified in the Storm Water Standards in Section 5.1. The combined flow and volume design basis allows for the volume of water that is flowing through the biotreatment basin during the storm event to be accounted for while using the volume based design basis, which would normally neglected. For the biotreatment area sizing calculations and back-up data see Appendix 5, for a workmap showing the proposed biotreatment basin locations see Appendix 6, and for cross sections of the proposed biotreatment areas, see Appendix 7. For reference information about the requirements for biotreatment soil specifications as well as planting guidance, please refer to Appendices C and D of the "Santa Clara Valley Urban Runoff Pollution Prevention Program – C.3 Stormwater Handbook," dated April 2012.

The following is an outline of the calculations used in the design of the biotreatment areas for the Santana Terrace project. .

1. Background numbers were gathered:
    - The Mean Annual Precipitation (MAP) for the site was determined using Figure A-2 of the Santa Clara County, California – Drainage Manual, dated 2007. An annotated copy of Figure A-2 has been included in Appendix 5.
    - The MAP Correction Factor was calculated by dividing the MAP value for the project site by the MAP value of 13.9 from the rain gauge at the San Jose Airport
    - Land use runoff coefficients were assigned per Table 5-4 of the Storm Water Standards.
    - The storm intensity was assumed to be 0.2 inches per hour from the direction in the combined flow and volume design basis direction.
2. The storage volume per square foot of treatment area was calculated from the ponding depth plus the growing media depth times the growing media void ratio. Storage within the gravel section was not included in the storage calculation because there is an underdrain proposed for the biotreatment basins.
3. The site was broken into drainage basins tributary to the proposed biotreatment areas and each area was analyzed to determine the proposed land uses and their associated areas.
4. The percent impervious was calculated by dividing the total area by the sum of the pavement/concrete areas and the roof areas.
5. The percent impervious value was used with Table 2: Unit Storage Volume for 80% Capture from the City of Santa Clara Stormwater Treatment Sizing Requirements Worksheets (May 2012) to determine the Unit Storage Volume for 80% Capture (UBSV) (values were linearly interpolated from the table)
6. The equivalent impervious area for the basin was calculated by multiplying each land use type by their associated runoff coefficient then dividing by the runoff coefficient for roofs to determine the equivalent impervious area for the basin.

7. The water quality design volume was calculated by multiplying the UBSV (converted to feet) by the equivalent impervious area.
8. The duration of the rain event was calculated by dividing the UBSV by the assumed intensity of 0.2 inches per hour.
9. The volume filtered per square foot was calculated by multiplying the soil infiltration rate of 5 inches per hour (converted to feet) by the duration of the rain event.
10. The total volume filtered and volume stored is the sum of the volume filtered per square foot and the volume filtered per square foot.
11. Area required to treat the water quality design volume is the water quality design volume divided by the total volume filtered and volume stored per square foot.

It was then confirmed that the total area provided for treatment was equal to or greater than the required volume. If not, the proposed treatment area was increased.

2.4 Hydromodification Management

Hydromodification management is the change in the timing, peak discharge, and volume of runoff from a site due to land development is known as "hydrograph modification" or "hydromodification" When a site is developed, some of the rain water can no longer infiltrate into the soils, so it flows offsite at faster rates and greater volumes, generally in a shorter time period. As a result, erosive levels of flow occur more frequently and for longer periods of time in creeks and channels downstream of the project.

The proposed Santana Terrace project is Hydromodification exempt for the following reasons:

1. As calculated in the Provision C.3 Data Form in Appendix 1, “2.Project Size,” the total post-project impervious area is not greater than the pre-project (existing) impervious area and is therefore hydromodification exempt.
2. The Santana Terrace project is located in an area where “Catchments [are] Draining to [a] Hardened Channel and/or Tidal Areas.” See the annotated HMP Applicability Map in Appendix 8.

3.0 OPERATION AND MAINTENANCE PLAN

3.1 Maintenance Responsibility

The owner of the site is the operator and will be the party responsible to ensure implementation and funding of maintenance of permanent stormwater control measures.

Throughout this section, the owner of the site is the "party responsible to ensure implementation and funding of maintenance for permanent stormwater control measures." The party who actually performs the activities is the "inspector," "maintenance contractor," or "maintenance operator."

3.2 Inspection and Maintenance Activities

3.2.1 Inspection and Maintenance Activities for LID and Source Control Measures

The following LID and source control measures for the project requires permanent maintenance: landscaped areas, and irrigation systems within the landscaped areas. The discussions below provide inspection criteria, maintenance indicators, and maintenance activities for the above-listed LID and source control measures that require permanent maintenance.

Landscaped Areas

Inspection and maintenance of the vegetated areas may be performed by the landscape maintenance contractor. The inspection and maintenance activities described herein for landscaped areas are inclusive of the LID biotreatment areas provided for the project. During inspection, the inspector shall check for the maintenance indicators given below:

- Erosion in the form of rills or gullies
- Ponding water
- Bare areas or less than 70% vegetation cover
- Animal burrows, holes, or mounds
- Trash
- Sediment or debris accumulation

Routine maintenance of vegetated areas shall include mowing and trimming vegetation, and removal and proper disposal of trash.

If erosion, ponding water, bare areas, poor vegetation establishment, or disturbance by animals are identified during the inspection, additional (non-routine) maintenance will be required to correct the problem. For ponding water or erosion, see also inspection and maintenance measures for irrigation systems. In the event that any non-routine maintenance issues are persistently encountered such as poor vegetation establishment, erosion in the form of rills or gullies, or ponding water, the party responsible to ensure that maintenance is performed in perpetuity shall consult a licensed landscape architect or engineer as applicable.

As applicable, IPM procedures must be incorporated in any corrective measures that are implemented in response to damage by pests. This may include using physical barriers to keep pests out of landscaping; physical pest elimination techniques, such as, weeding, squashing, trapping, washing, or pruning out pests; relying on natural enemies to eat pests; or proper use of pesticides as a last line of defense. More information can be obtained at the UC Davis website (http://www.ipm.ucdavis.edu/WATER/U/index.html).

Irrigation Systems

Inspection and maintenance of the irrigation system may be performed by the landscape maintenance contractor. During inspection, the inspector shall check for the maintenance indicators given below:

- Eroded areas due to concentrated flow
- Ponding water
- Refer to proprietary product information for the irrigation system for other maintenance indicators, as applicable

If none of the maintenance indicators listed above are identified during inspection of the irrigation system, no other action is required. If any of the maintenance indicators listed above is identified during the inspection, additional (non-routine) maintenance will be required to restore the irrigation system to an operable condition. If inspection indicates breaks or leaks in the irrigation lines or individual sprinkler heads, the affected portion of the irrigation system shall be repaired. If inspection indicates eroded areas due to concentrated flow from the irrigation system, the eroded areas shall be repaired and the irrigation system shall be adjusted or repaired as applicable to prevent further erosion. If inspection indicates ponding water resulting from the irrigation system, the irrigation system operator shall identify the cause of the ponded water and adjust or repair the irrigation system as applicable to prevent ponding water. Refer to proprietary product information for the irrigation system for other non-routine maintenance activities as applicable.

3.2.2 Inspection and Maintenance Activities for Treatment Control Measures

The treatment control measures for the proposed project consists of nineteen (19) biotreatment basins located throughout the project site. The proposed biotreatment basins should be inspected and maintained to ensure proper functionality over time. The discussion below provides recommendations for Operation and Maintenance for the biotreatment basins in order to ensure their lasting effectiveness.

During inspection, the inspector shall check for the maintenance indicators given below:

- Accumulation of sediment, litter and/or debris at the inlets/outlets
- Standing water in the storage and draining layer indicating clogging in the underdrains
- Dislodged energy dissipaters or erosion

Routine maintenance of the biotreatment basins shall include removal and proper disposal of accumulated materials (e.g., sediment, litter). After installation inspection should occur once a month for 4-6 months. After this time period inspection should occur annually, particularly after there has been heavy rain or storms.

If inspection indicates that the underdrains for the biotreatment basins are clogged, the additional non-routine maintenance will be required to backwash and clear the underdrains. The party responsible to ensure implementation and funding of maintenance of permanent treatment control measures shall contract for additional cleaning and disposal services as necessary if non-routine cleaning and disposal is required.

3.3 Inspection and Maintenance Frequency

The Table below lists the treatment control measures to be inspected and maintained and the minimum frequency of inspection and maintenance activities.

Table 1: Summary Table of Inspection and Maintenance Frequency

Treatment Control Measure	Inspection Frequency	Maintenance Frequency
Landscaped Areas	Monthly	Routine mowing and trimming and trash removal: monthly Non-routine maintenance as-needed based on maintenance indicators in Section 3.2.1
Outlet Protection	Monthly	Routine maintenance to remove trash, debris, and leaves. Repair any damage to roof drains. Immediately reposition all displaced energy dissipaters. If soil erosion is found, reposition or increase limits of energy dissipater to fully cover eroded area. Non-routine maintenance as-needed
Concrete Stamping (or equivalent)	Annual	As-needed if stamping has been damaged or removed,
Irrigation Systems	Monthly	As needed based on maintenance indicators in Section 3.2.1
Biotreatment Basins	Annual, and after major storm events	Routine maintenance to remove accumulated materials at the inlets and outlets: annually, on or before September 30th. As-needed maintenance based on maintenance indicators in Section 3.2.2

The frequencies given in the Summary Table of Inspection and Maintenance Frequency are minimum recommended frequencies for inspection and maintenance activities for the project. Typically, the frequency of maintenance required for permanent treatment control measures is site and drainage area specific. If it is determined during the regularly scheduled inspection and/or routine maintenance that a treatment control measure requires more frequent maintenance (e.g., to remove accumulated trash) it may be necessary to increase the frequency of inspection and/or routine maintenance.

3.4 Recordkeeping Requirements

The party responsible to ensure implementation and funding of maintenance of permanent treatment control measures shall maintain records documenting the inspection and maintenance activities. A sample maintenance record form has been included in Appendix 9. Also included in Appendix 9 is a key map showing the biotreatment locations with numbering for reference in the maintenance records.

4.0 SUMMARY

This preliminary storm water management plan (SWMP) summarizes storm water protection requirements for the Santana Terrace project that will collectively meet the requirements for LID and water quality treatment control measures. This report has been prepared in conjunction with a preliminary drainage study report, titled "Preliminary Drainage Study for Santana Terrace," dated June 22, 2015, which includes more details regarding drainage characteristics, such as drainage areas and design flows.

In addition to treatment control measures, the project will incorporate site design measures and source control measures, which are described in detail in Sections 2.1 and 2.2 of this report.

The project includes a proposed network of storm water management features dispersed throughout the site that will utilize biotreatment to meet the requirements for treatment control measures. Due to the presence of hydrologic Type C clayey soils onsite with a high potential for shrinkage and swelling it has been determined that an impermeable liner and underdrain will be used for all of the treatment facilities on site.

The proposed Santana Terrace project is Hydromodification exempt because the total post-project impervious area is not greater than the pre-project (existing) impervious area and the Santana Terrace project is located in an area where "Catchments [are] Draining to [a] Hardened Channel and/or Tidal Areas."

The following treatment control measures for the Santana Terrace project require permanent maintenance: landscaped areas, irrigation system, and biotreatment basins. The operation and maintenance information provided in Section 3.0 of this SWMP provides inspection criteria, maintenance indicators, and maintenance activities for the above-listed treatment control measures that require permanent maintenance.

The project has incorporated storm water management control measures to provide source control, LID site design, and water quality treatment in accordance with the guidelines and requirements set forth in the “Santa Clara Valley Urban Runoff Pollution Prevention Program – C.3 Stormwater Handbook,” dated April 2012, adopted by the City of Santa Clara.

APPENDIX 1

PROVISION C.3 DATA FORM

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

PROVISION C.3 DATA FORM

Which Projects Must Comply with Stormwater Requirements?

All projects that create and/or replace **10,000 sq. ft.** or more of impervious surface on the project site must fill out this worksheet and submit it with the development project application.

All restaurants, auto service facilities, retail gasoline outlets, and uncovered parking lot projects (stand-alone or part of another development project, including the top uncovered portion of parking structures) that create and/or replace **5,000 sq. ft.** or more of impervious surface on the project site must also fill out this worksheet.

Interior remodeling projects, routine maintenance or repair projects such as re-roofing and re-paving, and single family homes that are not part of a larger plan of development are **NOT** required to complete this worksheet.

What is an Impervious Surface?

An impervious surface is a surface covering or pavement that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to rooftops, walkways, paved patios, driveways, parking lots, storage areas, impervious concrete and asphalt, and any other continuous watertight pavement or covering. Pervious pavement, underlain with pervious soil or pervious storage material (e.g., drain rock), that infiltrates rainfall at a rate equal to or greater than surrounding unpaved areas OR that stores and infiltrates the water quality design volume specified in Provision C.3.d of the Municipal Regional Stormwater Permit (MRP), is not considered an impervious surface.

For More Information

For more information regarding selection of Best Management Practices for stormwater pollution prevention or stormwater treatment contact: the Planning Department at 408-615-2450 and request the Stormwater Pollution Prevention Information Packet.

1. Project Information

Project Name: SANTANA TERRACE **APN #** 303-16-073

Project Address: 100 NORTH WINCHESTER BOULEVARD, SANTA CLARA, CA

Cross Streets: PRUNERIDGE AVENUE AND FERNWOOD AVENUE

Applicant/Developer Name: USA PROPERTIES FUND, INC.

Project Phase(s): 1 **of** 1 **Engineer:** RICK ENGINEERING COMPANY

Project Type (Check all that apply): ☐ New Development ■ Redevelopment

■ Residential ☐ Commercial ☐ Industrial ☐ Mixed Use ☐ Public ☐ Institutional

☐ Restaurant ☐ Uncovered Parking ☐ Retail Gas Outlet ☐ Auto Service (SIC code)______
(5013-5014, 5541, 7532-7534, 7536-7539)

☐ Other ____________

Project Description: THIS DEVELOPMENT CONSISTS OF TWO SENIOR APARTMENT BUILDINGS INCLUDING 92 UNITS, A POOL AND MAINTENANCE BUILDING, PARKING, WALKWAYS, LANDSCAPED AREAS, AS WELL AS A POOL AND SPA, ON APPROXIMATELY 1.86 ACRES.

Project Watershed/Receiving Water (creek, river or bay):

☐ Calabasas Creek ☐ Saratoga Creek ■ San Tomas Aquino Creek ☐ Guadalupe River

2. Project Size

a. Total Site Area: 1.86 acre	b. Total Site Area Disturbed: 1.86 acre (including clearing, grading, or excavating)			
	Existing Area (ft²)	Proposed Area (ft²)		Total Post-Project Area (ft²)
		Replaced	New	
Impervious Area				
Roof	40,410	23,804	23,019	46,823
Parking	32,211	5,503	8,786	14,290
Sidewalks and Streets	754	58	11,079	11,137
c. Total Impervious Area	72,375	29,366	42,884	72,249
d. Total new and replaced impervious area		72,249		
Pervious Area				
Landscaping	8,782	4,487	4,422	8,908
Pervious Paving	0	0	0	0
Other (e.g. Green Roof)	0	0	0	0
e. Total Pervious Area	8,782	4,487	4,422	8,908
f. Percent Replacement of Impervious Area in Redevelopment Projects (Replaced Total Impervious Area ÷ Existing Total Impervious Area) x 100% = 40.6 %				

3. **State Construction General Permit Applicability:**

   a. Is #2.b. equal to 1 acre or more?

   ■ Yes, applicant must obtain coverage under the State Construction General Permit (i.e., file a Notice of Intent and prepare a Stormwater Pollution Prevention Plan) (see www.swrcb.ca.gov/water_issues/programs/stormwater/construction.shtml for details).

   ☐ No, applicant does not need coverage under the State Construction General Permit.

4. **MRP Provision C.3 Applicability:**

   a. Is #2.d. equal to **10,000** sq. ft. or more, or **5,000** sq. ft. or more for restaurants, auto service facilities, retail gas outlets, and uncovered parking?

   *(*Note that for public projects, the 5,000 sq. ft. threshold does not take effect until 12/1/12.)*

   ■ Yes, C.3. source control, site design and treatment requirements apply

   ☐ No, C.3. source control and site design requirements may apply – check with local agency

   b. Is #2.f. equal to 50% or more?

   ☐ Yes, C.3. requirements (site design and source control, as appropriate, and stormwater treatment) apply to entire site

   ■ No, C.3. requirements only apply to impervious area created and/or replaced

5. **Hydromodification Management (HM) Applicability:**

   a. Does project create and/or replace one acre or more of impervious surface AND is the total post-project impervious area greater than the pre-project (existing) impervious area?

   ☐ Yes (continue) ■ No – exempt from HM, go to page 3

   b. Is the project located in an area of HM applicability (green area) on the HM Applicability Map? (www.scvurppp-w2k.com/hmp_maps.htm)

   ☐ Yes, project must implement HM requirements

   ■ No, project is exempt from HM requirements

6. Selection of Specific Stormwater Control Measures:

Site Design Measures

- ■ Minimize land disturbed
- ■ Minimize impervious surfaces
- ❑ Minimum-impact street or parking lot design
- ■ Cluster structures/ pavement
- ■ Disconnected downspouts
- ❑ Pervious pavement
- ❑ Green roof
- ❑ Microdetention in landscape
- ❑ Other self-treating area
- ❑ Self-retaining area
- ❑ Rainwater harvesting and use (e.g., rain barrel, cistern connected to roof drains) [1]
- ❑ Preserved open space: _______ ac. or sq. ft .(circle one)
- ❑ Protected riparian and wetland areas/buffers (Setback from top of bank: _______ft.)
- ❑ Other _______________

Source Control Measures

- ❑ Alternative building materials
- ❑ Wash area/racks, drain to sanitary sewer[2]
- ■ Covered dumpster area, drain to sanitary sewer[2]
- ■ Sanitary sewer connection or accessible cleanout for swimming pool/spa/fountain[2]
- ■ Beneficial landscaping (minimize irrigation, runoff, pesticides and fertilizers; promotes treatment)
- ❑ Outdoor material storage protection
- ❑ Covers, drains for loading docks, maintenance bays, fueling areas
- ■ Maintenance (pavement sweeping, catch basin cleaning, good housekeeping)
- ■ Storm drain labeling
- ❑ Other _______________

Treatment Systems

- ❑ None (all impervious surface drains to self-retaining areas)

LID Treatment

- ❑ Rainwater harvest and use (e.g., cistern or rain barrel sized for C.3.d treatment)
- ❑ Infiltration basin
- ❑ Infiltration trench
- ❑ Exfiltration trench
- ❑ Underground detention and infiltration system (e.g. pervious pavement drain rock, large diameter conduit)

Biotreatment [3]

- ■ Bioretention area
- ■ Flow-through planter
- ❑ Tree box with bioretention soils
- ❑ Other _______________

Other Treatment Methods

- ❑ Proprietary tree box filter[4]
- ❑ Media filter (sand, compost, or proprietary media)[4]
- ❑ Vegetated filter strip[5]
- ❑ Dry detention basin[5]
- ❑ Other _______________

Flow Duration Controls for Hydromodification Management (HM)

- ❑ Detention basin
- ❑ Underground tank or vault
- ❑ Bioretention with outlet control
- ❑ Other _______________

[1] Optional site design measure; does not have to be sized to comply with Provision C.3.d treatment requirements.
[2] Subject to sanitary sewer authority requirements.
[3] Biotreatment measures are allowed only with completed feasibility analysis showing that infiltration and rainwater harvest and use are infeasible.
[4] These treatment measures are only allowed if the project qualifies as a "Special Project".
[5] These treatment measures are only allowed as part of a multi-step treatment process.

7. Treatment System Sizing for Projects with Treatment Requirements

Indicate the hydraulic sizing criteria used and provide the calculated design flow or volume:

Treatment System Component	Hydraulic Sizing Criteria Used[3]	Design Flow or Volume (cfs or cu.ft.)
BIOTREATMENT AREAS	3	VOLUME: 3,454.6

[3]Key: 1a: Volume – WEF Method
1b: Volume – CASQA BMP Handbook Method
2a: Flow – Factored Flood Flow Method
2b: Flow – CASQA BMP Handbook Method
2c: Flow – Uniform Intensity Method
3: Combination Flow and Volume Design Basis

8. Alternative Certification: Was the treatment system sizing and design reviewed by a qualified third-party professional that is not a member of the project team or agency staff?

☐ Yes ■ No Name of Reviewer ____________________

9. Operation & Maintenance Information

A. Property Owner's Name USA PROPERTIES FUND, INC.

B. Responsible Party for Stormwater Treatment/Hydromodification Control O&M:

a. Name: ART MAY

b. Address: 3200 DOUGLAS BLVD. SUITE 200; ROSEVILLE, CA 95661

c. Phone/E-mail: (916) 773-6060 AMAY@USAPROPFUND.COM

This section to be completed by Municipal staff.

O&M Responsibility Mechanism

Indicate how responsibility for O&M is assured. Check all that apply:

☐ O&M Agreement

☐ Other mechanism that assigns responsibility (describe below):

____

____

APPENDIX 2

INFILTRATION/HARVESTING AND USE FEASIBILITY SCREENING WORKSHEET

Infiltration/Harvesting and Use Feasibility Screening Worksheet

Apply these screening criteria for ***C.3 Regulated Projects*** ** required to implement Provision C.3 stormwater treatment requirements. See the Glossary (Attachment 1) for definitions of terms marked with an asterisk (*). Contact municipal staff to determine whether the project meets* ***Special Project*** ** criteria. If the project meets Special Project criteria, it may receive LID treatment reduction credits.*

1. Applicant Info

Site Address: 100 NORTH WINCHESTER BLVD SANTA CLARA, CA APN: 303-16-073

Applicant Name: USA PROPERTIES FUND, INC. Phone No.: (916) 773-6060

Mailing Address: 3200 DOUGLAS BLVD, SUITE 200, ROSEVILLE, CA 95661

2. Feasibility Screening for Infiltration

Do site soils either (a) have a **saturated hydraulic conductivity*** (Ksat) that will NOT allow infiltration of 80% of the annual runoff (that is, the Ksat is LESS than 1.6 inches/hour), or, if the Ksat rate is not available, (b) consist of Type C or D soils?[1]

■ Yes (continue) ☐ No – complete the Infiltration Feasibility Worksheet. If infiltration of the C.3.d amount of runoff is found to be feasible, there is no need to complete the rest of this screening worksheet.

3. Recycled Water Use

Check the box if the project is installing and using a recycled water plumbing system for non-potable water use.

☐ The project is installing a recycled water plumbing system, and installation of a second non-potable water system for harvested rainwater is impractical, and considered infeasible due to cost considerations. Skip to Section 6.

4. Calculate the Potential Rainwater Capture Area* for Screening of Harvesting and Use

Complete this section for the entire project area. If rainwater harvesting and use is infeasible for the entire site, and the project includes one or more buildings that each have an individual roof area of 10,000 sq. ft. or more, then complete Sections 4 and 5 of this form for each of these buildings.

4.1 Table 1 for (check one): ■ The whole project ☐ Area of 1 building roof (10,000 sq.ft. min.)

Table 1: Calculation of the Potential Rainwater Capture Area*
The Potential Rainwater Capture Area may consist of either the entire project area or one building with a roof area of 10,000 sq. ft. or more.

	1	2	3	4
	Pre-Project Impervious surface[2] (sq.ft.), if applicable	Proposed Impervious Surface[2] (IS), in sq. ft.		Post-project landscaping (sq.ft.), if applicable
		Replaced[3] IS	Created[4] IS	
a. Enter the totals for the area to be evaluated:	72,375	67,954	4,296	8,908
b. Sum of replaced and created impervious surface:	N/A	72,249		N/A
c. Area of existing impervious surface that will NOT be replaced by the project.	0	N/A		N/A

[1] Base this response on the site-specific soil report, if available. If this is not available, consult soil hydraulic conductivity maps in Attachment 3.
[2], Enter the total of all impervious surfaces, including the building footprint, driveway(s), patio(s), impervious deck(s), unroofed porch(es), uncovered parking lot (including top deck of parking structure), impervious trails, miscellaneous paving or structures, and off-lot impervious surface (new, contiguous impervious surface created from road projects, including sidewalks and/or bike lanes built as part of new street). Impervious surfaces do NOT include vegetated roofs or pervious pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding, unpaved landscaped areas, or that stores and infiltrates the **C.3.d amount of runoff***.
[3] "Replaced" means that the project will install impervious surface where existing impervious surface is removed.
[4] "Created" means the project will install new impervious surface where there is currently no impervious surface.
* For definitions, see Glossary (Attachment 1).

4.2 Answer this question ONLY if you are completing this section for the entire project area. If existing impervious surface will be replaced by the project, does the area to be replaced equal 50% or more of the existing area of impervious surface? *(Refer to Table 1, Row "a". Is the area in Column 2 > 50% of Column 1?)*

■ Yes, C.3. stormwater treatment requirements apply to areas of impervious surface that will remain in place as well as the area created and/or replaced. This is known as the 50% rule.

☐ No, C.3. requirements apply only to the impervious area created and/or replaced.

4.3 Enter the square footage of the **Potential Rainwater Capture Area***. If you are evaluating only the roof area of a building, or you answered "no" to Question 4.2, this amount is from Row "b" in Table 1. If you answered "yes" to Question 4.2, this amount is the sum of Rows "b" and "c" in Table 1.:

72,249 square feet.

4.4 Convert the measurement of the **Potential Rainwater Capture Area*** from square feet to acres (divide the amount in Item 4.3 by 43,560):

1.66 acres.

5. Feasibility Screening for Rainwater Harvesting and Use

5.1 Use of harvested rainwater for landscape irrigation:

Is the onsite landscaping LESS than 2.5 times the size of the **Potential Rainwater Capture Area*** (Item 4.3)? (Note that the landscape area(s) would have to be contiguous and within the same Drainage Management Area to use harvested rainwater for irrigation via gravity flow.)

■ Yes (continue) ☐ No – Direct runoff from impervious areas to **self-retaining areas*** OR refer to Table 11 and the curves in Appendix F of the LID Feasibility Report to evaluate feasibility of harvesting and using the C.3.d amount of runoff for irrigation.

5.2 Use of harvested rainwater for toilet flushing or non-potable industrial use:

a. Residential Projects: Proposed number of dwelling units: 92

Calculate the dwelling units per impervious acre by dividing the number of dwelling units by the acres of the **Potential Rainwater Capture Area*** in Item 4.4. Enter the result here:

55.4)

Is the number of dwelling units per impervious acre LESS than 100 (assuming 2.7 occupants/unit)?

■ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet.

b. Commercial/Industrial Projects: Proposed interior floor area: ________ (sq. ft.)

Calculate the proposed interior floor area (sq.ft.) per acre of impervious surface by *dividing the interior floor area (sq.ft.) by the acres of the **Potential Rainwater Capture Area*** in Item 4.4. Enter the result here:*

____

Is the square footage of the interior floor space per impervious acre LESS than 70,000 sq. ft.?

☐ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet

c. School Projects: Proposed interior floor area: ________ (sq. ft.)

Calculate the proposed interior floor area per acre of impervious surface by *dividing the interior floor area (sq.ft.) by the acres of the **Potential Rainwater Capture Area*** in Item 4.4 . Enter the result here:*

________.

Is the square footage of the interior floor space per impervious acre LESS than 21,000 sq. ft.?

☐ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet

* For definitions, see Glossary (Attachment 1).

d. Mixed Commercial and Residential Use Projects

- Evaluate the residential toilet flushing demand based on the dwelling units per impervious acre for the residential portion of the project, following the instructions in Item 5.2.a, except you will use a prorated acreage of impervious surface, based on the percentage of the project dedicated to residential use.
- Evaluate the commercial toilet flushing demand per impervious acre for the commercial portion of the project, following the instructions in Item 5.2.a, except you will use a prorated acreage of impervious surface, based on the percentage of the project dedicated to commercial use.

e. Industrial Projects: Estimated non-potable water demand (gal/day): ______________

Is the non-potable demand LESS than 2,400 gal/day per acre of the Potential Rainwater Capture Area?

☐ Yes (continue) ☐ No – refer to the curves in Appendix F of the LID Feasibility Report to evaluate feasibility of harvesting and using the C.3.d amount of runoff for industrial use.

6. Use of Biotreatment

If only the "Yes" boxes were checked for all questions in Sections 2 and 5, or the project will have a recycled water system for non-potable use (Section 3), then the applicant may use appropriately designed bioretention facilities for compliance with C.3 treatment requirements. The applicant is encouraged to maximize infiltration of stormwater if site conditions allow.

7. Results of Screening Analysis

Based on this screening analysis, the following steps will be taken for the project (check all that apply):

■ Implement biotreatment measures (such as an appropriately designed bioretention area).

☐ Conduct further analysis of infiltration feasibility by completing the Infiltration Feasibility Worksheet.

☐ Conduct further analysis of rainwater harvesting and use (check one):

- ☐ Complete the Rainwater Harvesting and Use Feasibility Worksheet for:
  - ☐ The entire project
  - ☐ Individual building(s), if applicable, describe: ______________
- ☐ Evaluate the feasibility of harvesting and using the C.3.d amount of runoff for irrigation, based on Table 11 and the curves in Appendix F of the LID Feasibility Report
- ☐ Evaluate the feasibility of harvesting and using the C.3.d amount of runoff for non-potable industrial use, based on the curves in Appendix F of the LID Feasibility Report.

* For definitions, see Glossary (Attachment 1).

APPENDIX 3

STORMWATER TREATMENT SIZING REQUIREMENTS WORKSHEETS

City of Santa Clara
Stormwater Treatment Sizing Requirements Worksheets

I. Introduction

All development projects creating or replacing 10,000 sq. ft. or more of impervious surface (or 5,000 sq. ft. for automotive shops, gas stations, restaurants and parking lots) on the project site are subject to the requirements of Provision C.3. of the City's stormwater discharge permit, which include providing low impact development (LID) treatment measures for runoff from impervious surfaces.

There are three methods of sizing treatment measures (see Table 1 for examples):

- **Volume-based** - the method for treatment measures that operate based on the volume of water treated (i.e., they detain an amount of runoff for a certain amount of time to allow settling, contact with media, or infiltration into the soil);
- **Flow-based** – the method for treatment measures that operate based on a continuous flow of runoff and remove pollutants either by filtration or centrifugal force;
- **Combination volume- and flow-based** – a method for treatment measures that are designed for both storage of a volume of water and flow through a filtration media.

The City of Santa Clara's stormwater permit provides several options for design criteria for volume- and flow-based treatment measures. The City has reviewed these options and developed a simplified design approach that reflects the rainfall and runoff characteristics typical of City projects. Use of the simplified approach presented in these worksheets is encouraged by City staff for design of treatment measures for most projects.

Table 1. Flow- and Volume-Based Treatment Measure Sizing Criteria

Type of Treatment Measure	LID?	Hydraulic Sizing Criteria
Bioretention area	Yes	Flow- or volume-based or combination
Flow-through planter box	Yes	Flow- or volume-based or combination
Tree well filter (biotreatment soil)	Yes	Flow-based
Infiltration trench	Yes	Volume-based
Subsurface infiltration system	Yes	Volume-based
Rainwater harvesting and reuse	Yes	Volume-based
Media filter	No	Flow-based
Extended detention basin	No	Volume-based

II. Type of Treatment Measure Proposed for Project

1. Does the treatment measure operate based on the volume of water? X Yes ____ No

   If Yes, continue to Section III.—Sizing for Volume-Based Treatment Controls on page 2.

2. Does the treatment measure operate based on flow through the unit? X Yes ____ No

   If Yes, continue to Section IV.—Sizing for Flow-Based Treatment Controls on page 5.

III. City of Santa Clara Simplified Method for Sizing Volume-Based Controls

The City's permit allows two methods for sizing volume-based controls—the Urban Runoff Quality Management method (URQM Method) or the California Stormwater Best Management Practice[1] (BMP) Handbook Method. The City of Santa Clara has selected a preferred method from these two to conduct sizing of volume-based controls. The simplified method is based on several assumptions and uses parameters specific to the City of Santa Clara.

The simplified method utilizes the California BMP Handbook Method, adapted based on local conditions, and the San Jose rain gauge curves. This simplified approach makes the following assumptions:

A. The project site slopes are close to 1% or less.

B. The soils are either clay or heavily compacted.

The equation that will be used to size the BMP is:

BMP Volume = (Correction Factor) × (Unit Storage) × (Drainage Area to the BMP)

Step 1: Determine the percent imperviousness of the area draining to the BMP.

a. Determine the drainage area for the BMP: 1.86 acres

b. Determine the amount of impervious surface area in the drainage area: 1.66 acres

c. Determine percent imperviousness of the drainage area: 89.2 %

% impervious area = (amount of impervious area/drainage area for the BMP) × 100

% impervious area = 89.2

Step 2: Find the unit storage volume for capture of 80% of annual runoff (inches)—assuming clay soil and ≤1% slope.

a. Using the site imperviousness value from **Step 1.c.** above and **Table 2** below, obtain the unit storage volume. 0.55 (inches)

[1] For the purpose of this worksheet, a stormwater best management practice, or BMP, is the same as a stormwater treatment measure or device.

Table 2: Unit Storage Volume for 80% Capture[2]
(assuming 1% slope, San Jose Airport Rain Gauge, clay soils)

Percent Site Imperviousness	Unit Basin Storage for 80% Capture (inch)
30%	0.36
35%	0.37
40%	0.38
45%	0.39
50%	0.40
55%	0.42
60%	0.44
65%	0.46
70%	0.47
75%	0.49
80%	0.51
85%	0.53
90%	0.55
95%	0.57
100%	0.58

[2] Source: SCVURPPP C.3. Stormwater Handbook, April 2012. Appendix B, Figure B-2: "Unit Basin Volume for 80% Capture – San Jose Airport Rain Gage."

Step 3: Determine the mean annual rainfall at the site to determine the correction factor.

a. Locate the project site on **Figure 1**. Estimate the mean annual rainfall at the location of the project: 14.9 inches

(Each line on Figure 1, called a rainfall isopleth, indicates locations where the same amount of rainfall falls on average each year (e.g., the isopleth marked 14 indicates that areas crossed by this line average 14 inches of rainfall per year). If the project location is between two lines, estimate the mean annual rainfall depending on the location of the site—your estimate should be between 13 and 16 inches.)

b. The San Jose Airport gauge is the nearest rain gauge. Its mean annual rainfall is 13.9 inches. Determine the correction factor for the rainfall at the site using the information from **Step 3.a.**, and the San Jose Airport rain gauge.

Correction Factor = mean annual rainfall at the site (from Step 3.a.)/13.9 inches

Correction Factor: 1.072

Step 4: Size the BMP, using the following equation:

BMP Volume = (Correction Factor) × (Unit Storage Volume) × (Drainage Area to BMP)

BMP Volume = (Step 3.b.) × (Step 2.a. (in.)) × (Step 1.a. (ac.)) × 43,560 ft^2/ac ÷ 12 in./ft.

BMP Volume = 3,981 cubic feet

IV. City of Santa Clara Simplified Method for Sizing Flow-Based Treatment Measures

The City's permit allows three methods for sizing flow-based treatment measures—the Factored Flood Flow Method (10% of the 50-year peak rainfall intensity); the California BMP Handbook Method (the flow produced by a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity); or the Uniform Intensity method (the flow produced by a rain event equal to 0.2 inches/hour). The City of Santa Clara has selected the California BMP Handbook Method for sizing of flow-based controls. The Uniform Intensity method may also be used.

California BMP Handbook Flow Approach

The design rainfall intensity (I) is twice the 85th percentile value. The 85th percentile hourly rainfall intensity for San Jose Airport rain gauge is 0.087 in /hr. Therefore, the design rainfall intensity that is equivalent to twice the 85th percentile storm event for the San Jose Airport rain gauge is **0.17 in /hr.**

The intensity represents the rate of rainfall (a depth per hour) and needs to be converted to a flow of runoff from the drainage area to the BMP.

The flow is calculated using the rational formula Q = CIA, where:

Q is the flow in cubic feet per second (cfs),

C is the runoff coefficient of the drainage area to the BMP

I is the design intensity, adjusted for project location (in/hr), and

A is the area draining to the BMP (acres)

Step 1. Determine the drainage area (A) for the BMP in acres: 1.86 ac.

Step 2. Determine the amount of impervious area draining to the BMP (acres): 1.66 ac.

Step 3. Determine the impervious ratio, *i:* (not the same as "I", the rainfall intensity)

i = (percent imperviousness of drainage area for BMP) ÷ 100
-- OR --
i = amount of impervious area (acres)/drainage area for the BMP (A) (acres)

i = 0.89 (range will be from 0-1)

Step 4. Determine the runoff coefficient, C, using **Table 3** below
OR the following equation, where i = impervious ratio from **Step 3.**

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

C = 0.72

Table 3: Runoff Coefficients "C"

Site Imperviousness (i)	Runoff Coefficient C
0.00	0.04
0.05	0.08
0.10	0.11
0.15	0.14
0.20	0.17
0.25	0.20
0.30	0.23
0.35	0.25
0.40	0.28
0.45	0.31
0.50	0.34
0.55	0.37
0.60	0.41
0.65	0.45
0.70	0.49
0.75	0.54
0.80	0.60
0.85	0.66
0.90	0.73
0.95	0.81
1.00	0.89

Step 5. Determine the mean annual rainfall at the site to determine the correction factor for the design rainfall intensity.

a. Locate the project site on **Figure 1**. Estimate the mean annual rainfall at the location of the project: 14.9 inches

(Each line on Figure 1, called a rainfall isopleth, indicates locations where the same amount of rainfall falls on average each year (e.g., the isopleth marked 14 indicates that areas crossed by this line average 14 inches of rainfall per year). If the project location is between two lines, estimate the mean annual rainfall depending on the location of the site—your estimate should be between 13 and 16 inches.)

b. The San Jose Airport gauge is the nearest rain gauge. Its mean annual rainfall is 13.9 inches. Determine the correction factor for the rainfall at the site using the information from **Step 5.a.**, and the San Jose Airport rain gauge.

Correction Factor = mean annual rainfall at the site (from Step 5.a.)/13.9 inches

Correction Factor: 1.072

Step 6. Determine the design flow (Q) using Q = CIA, where C is the runoff coefficient, I is the adjusted design intensity (in/hr), and A is the drainage area for the BMP (acres)

Q = CIA = (Runoff Coefficient) × (Rainfall intensity) × (Correction factor) × (Drainage area to BMP)

Q = (**Step 4**) × (0.17 in/hr) × (**Step 5.b.**) × (**Step 1** (acres))

Q = 0.24 cfs [3]

[3] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) × (43,560 sq.ft/acre) × (1ft/12 in) × (1hr/3600 sec) = 1 ft^3/ sec or cfs.

APPENDIX 4

EXCERPTS FROM THE GEOTECH REPORT
AND THE NRCS SOILS REPORT

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED SANTANA ATRIUM SENIOR APARTMENTS
100 N. WINCHESTER BOULEVARD
SANTA CLARA, SANTA CLARA COUNTY, CALIFORNIA

KA PROJECT NO. 042-15006
MARCH 26, 2015

Prepared for:

MR. ROYCE PATCH
USA PROPERTIES FUND, INC.
3200 DOUGLASS BOULEVARD, SUITE 200
ROSEVILLE, CALIFORNIA 95661

Prepared by:

KRAZAN & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING DIVISION
1061 SERPENTINE LANE, SUITE F
PLEASANTON, CALIFORNIA 94566
(925) 307-1160

Krazan & ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

March 26, 2015

KA Project No. 042-15006

Mr. Royce Patch
USA Properties Fund, Inc.
3200 Douglas Boulevard, Suite 200
Roseville, California 95661

RE: Geotechnical Engineering Investigation
Proposed Santana Atrium Senior Apartments
100 N. Winchester Boulevard
Santa Clara, Santa Clara County, California

Dear Mr. Patch:

In accordance with your request, we have completed a Geotechnical Engineering Investigation for the above-referenced site. The results of our investigation are presented in the attached report.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (925) 307-1160.

REGISTERED PROFESSIONAL ENGINEER
DAVID R. JAROSZ II
NO. 2698
Expires June 30, 2016
GEOTECHNICAL
STATE OF CALIFORNIA

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

David R. Jarosz, II
Managing Engineer
RGE No. 2698/RCE No. 60185

DRJ:ht

TABLE OF CONTENTS

20 feet are non-liquefiable due to the absence of groundwater. The soils below a depth of 20 feet have a slight potential for liquefaction under seismic shaking due to predominately loose silty sand, firm sandy clay soils, and the anticipated moderate seismicity in the region.

The analysis also indicates that the estimated total seismic induced settlement is less than ¾ inch. Differential settlement caused by a seismic event is estimated to be less than ¼ inch. The anticipated differential settlement is estimated over the width of the structure.

SEISMIC SETTLEMENT

One of the most common phenomena during seismic shaking accompanying any earthquake is the settlement of loose unconsolidated soils. Based on site subsurface conditions and the moderate to high seismicity of the region, any loose fill material at the site could be vulnerable to this potential hazard. However, this hazard can be mitigated by following the design and construction recommendations of our Geotechnical Engineering Investigation (over-excavation and rework of the loose soils and/or fill). Based on the moderate penetration resistance measured, the native deposits underlying the site do not appear to be subject to significant seismic settlement.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of our field and laboratory investigations, along with previous geotechnical experience in the project area, the following is a summary of our evaluations, conclusions, and recommendations.

Administrative Summary

In brief, the subject site and soil conditions, with the exception of the fill material, moderate shrink/swell potential of the upper clayey soils, potential seismic settlement and existing development appear to be conducive to the development of the project. Approximately 2½ to 6½ feet of fill material was encountered within the borings drilled across the site. The fill material predominately consisted of silty clay, sandy clay and gravelly silty sand. The thickness and extent of fill material was determined based on limited test borings and visual observations. Thicker fill may be present at the site. Limited testing was performed on the fill soil during the time of our field and laboratory investigations. The limited testing indicates that the fill material ranged from loosely placed to compacted. Therefore, it is recommended that the fill soil be excavated and stockpiled so that the native soils can be properly prepared. The fill material that does not contain clay will be suitable for reuse as non-expansive Engineered Fill provided it is cleansed of excessive organics and debris. The clayey fill soils will not be suitable for reuse as non-expansive Engineered Fill. However, the clayey fill material will be suitable for reuse as General Engineered Fill, provided it is cleansed of excessive organics and debris and moisture-conditioned to a minimum of 2 percent above optimum moisture-content. The fill material should be compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Prior to fill placement Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

The on-site clayey soils appear to have a moderate shrink/swell potential. To reduce potential soil movement related to shrink/swell of the clayey soils, it is recommended that slab-on-grade and exterior flatwork areas be supported by at least 24 inches of non-expansive Engineered Fill. The fill material should be a well-graded silty sand or sandy silt soil. A clean sand or very sandy soil is not acceptable for this purpose. A sandy soil will allow the surface water to drain into the expansive soils below, which may result in soil swelling. The replacement soils and/or upper 24 inches of Imported Fill soils should meet the specifications as described under the subheading Engineered Fill. The replacement soils should extend 5 feet beyond the perimeter of slab-on-grade areas. The non-expansive replacement soils should be compacted to at least 90 percent of relative compaction based on ASTM Test Method D1557. The exposed native soils in the excavation should not be allowed to dry out and should be kept continually moist, prior to backfilling. In addition, it is recommended that slab-on-grade, continuous footings and slabs be nominally reinforced to reduce cracking and vertical off-set.

As an alternative to the use of non-expansive soils, the upper 24 inches of soil supporting the slab-on-grade and exterior flatwork areas can consist of lime-treated clayey soils. The lime-treated soils should be recompacted to a minimum of 90 percent of maximum density. Preliminary application rate of lime should be 5 percent by dry weight. The lime material should be calcium oxide, commonly known as quick-lime. The clayey soils should be above optimum moisture during the mixing operations. In lieu of supporting the structure on non-expansive Engineered Fill or lime-treated material, the building can be supported on a post-tensioned slab system designed to withstand the movements associated with the on-site clayey soils.

The site is presently occupied by a commercial development. In addition, portions of the site are covered with concrete and asphaltic concrete pavement. Associated with these developments are buried structures that may extend throughout the project site. Demolition activities should include proper removal of any buried structures. Any buried structures including utilities or loosely backfilled excavations, encountered during construction should be properly removed and the resulting excavations backfilled. After demolition activities, it is recommended that these disturbed soils be removed and/or recompacted. This compaction effort should stabilize the upper soils and locate any unsuitable or pliant areas not found during our field investigation.

After completion of the recommended site preparation and over-excavation, the site should be suitable for shallow footing support. The proposed structure footings may be designed utilizing an allowable bearing pressure of 2,500 psf for dead-plus-live loads. Footings should have a minimum embedment of 18 inches. As an alternative, the proposed structure may be supported by a post-tensioned or structural slab. Utilization of a post-tensioned/structural slab designed utilizing the parameters provided in the post-tension section of this report will eliminate the requirement for 24 inches of non-expansive or lime-treated Engineered Fill below concrete slabs-on-grade. However, the previously recommended densification of the upper native soils and fill material at the site should still be performed. Recommendations for a structural slab system are also provided herein.

Groundwater Influence on Structures/Construction

During our field investigation, groundwater was not encountered. However, historic groundwater levels are anticipated to be as shallow as 20 feet below existing site grade. Based on the anticipated depth of construction, groundwater is not anticipated to impact the proposed construction. Therefore, dewatering and/or waterproofing may be required. If groundwater is encountered, our firm should be consulted prior to dewatering the site. Installation of a standpipe piezometer is suggested prior to construction. The Contractor should refer to the soil boring logs in Appendix A for available information regarding groundwater levels at specific locations.

In addition to the groundwater level, if earthwork is performed during or soon after periods of precipitation, the subgrade soils may become saturated, pump, or not respond to densification techniques. Typical remedial measures include discing and aerating the soil during dry weather; mixing the soil with dryer materials; removing and replacing the soil with an approved fill material; or mixing the soil with an approved lime or cement product. Our firm should be consulted prior to implementing remedial measures to observe the unstable subgrade conditions and provide appropriate recommendations.

Site Preparation

General site clearing should include removal of vegetation; existing utilities; structures including foundations; basement walls and floors; existing stockpiled soil; trees and associated root systems; rubble; rubbish; and any loose and/or saturated materials. Site stripping should extend to a minimum depth of 2 to 4 inches, or until all organics in excess of 3 percent by volume are removed. Deeper stripping may be required in localized areas. These materials will not be suitable for reuse as Engineered Fill. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas.

Approximately 2½ to 6½ feet of fill material was encountered within the borings drilled across the site. The fill material predominately consisted of silty clay, sandy clay, gravelly silty sand, aggregate base and asphaltic concrete. The thickness and extent of fill material was determined based on limited test borings and visual observations. Thicker fill may be present at the site. Limited testing was performed on the fill soil during the time of our field and laboratory investigations. The limited testing indicates that the fill material ranged from loosely placed to compacted. Therefore, it is recommended that the fill soil be excavated and stockpiled so that the native soils can be properly prepared. The fill material that does not contain clay will be suitable for reuse as non-expansive Engineered Fill provided it is cleansed of excessive organics and debris. The clayey fill soils will not be suitable for reuse as non-expansive Engineered Fill. However, the clayey fill material will be suitable for reuse as General Engineered Fill, provided it is cleansed of excessive organics and debris and moisture-conditioned to a minimum of 2 percent above optimum moisture-content. The fill material should be compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Prior to fill placement Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal will be required.

The site is presently occupied by a commercial building and is presently utilized as a commercial development. Associated with this development are buried structures such as utility lines and possible water wells that may extend into the project site. Any buried structures, such as utilities or loosely backfilled excavations, encountered during construction should be properly removed and the resulting excavations backfilled. After demolition activities, it is recommended that these disturbed soils be removed and/or recompacted. Excavations, depressions, or soft and pliant areas extending below planned, finished subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill. In general, any septic tanks, debris pits, cesspools, or similar structures should be entirely removed. Water wells should be abandoned in accordance with county standards. Concrete footings should be removed to an equivalent depth of at least 3 feet below proposed footing elevations or as recommended by the Soils Engineer. Any other buried structures should be removed in accordance with the recommendations of the Soils Engineer. The resulting excavations should be backfilled with Engineered Fill.

Following stripping, fill removal operations, demolition activities, and prior to fill placement, the exposed subgrade in building, pavement, and exterior flatwork areas should be excavated/scarified to a depth of at least 12 inches, worked until uniform and free from large clods, moisture-conditioned to a minimum of 2 percent above optimum moisture content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation.

It is recommended that the upper 24 inches of soil within proposed conventional slab-on-grade and exterior flatwork areas consist of non-expansive Engineered Fill or lime-treated Engineered Fill. The fill placement serves two functions: 1) it provides a uniform amount of soil which will more evenly distribute the soil pressures and 2) it reduces moisture content fluctuation in the clayey material beneath the building area. The non-expansive fill material should be a well-graded silty sand or sandy silt soil. A clean sand or very sandy soil is not acceptable for this purpose. A sandy soil will allow the surface water to drain into the expansive clayey soil below, which may result in soil swelling. Imported Fill should be approved by the Soils Engineer prior to placement. The fill should be placed as specified as Engineered Fill. In addition, concrete slabs and flatwork should be nominally reinforced to reduce cracking and vertical off-sets.

As indicated previously, fill material is located across the site. It is recommended that any uncertified fill material encountered within pavement areas, be removed and/or recompacted. The fill material should be moisture-conditioned to a minimum of 2 percent above optimum moisture and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. As an alternative, the Owner may elect not to recompact the existing fill within paved areas. However, the Owner should be aware that the paved areas may settle which may require annual maintenance. At a minimum, it is recommended that the upper 12 inches of subgrade soil be moisture-conditioned to a minimum of 2 percent above optimum moisture content and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

The upper soils, during wet winter months, become very moist due to the absorptive characteristics of the soil. Earthwork operations performed during winter months may encounter very moist unstable soils, which may require removal to grade a stable building foundation. Project site winterization consisting of placement of aggregate base and protecting exposed soils during the construction phase should be performed.

A representative of our firm should be present during all site clearing and grading operations to test and observe earthwork construction. This testing and observation is an integral part of our service, as acceptance of earthwork construction is dependent upon compaction and stability of the material. The Soils Engineer may reject any material that does not meet compaction and stability requirements. Further recommendations of this report are predicated upon the assumption that earthwork construction will conform to recommendations set forth in this section and the Engineered Fill section.

Engineered Fill

The on-site upper native soils and fill material are predominately silty sands, clayey sands, silty clays and sandy clays. These soils contained varying amounts of gravel. The clayey soils will not be suitable for reuse as non-expansive Engineered Fill. The clayey soils will be suitable for reuse for fill placement within the upper 24 inches of conventional slab-on-grade and exterior flatwork areas, provided they are lime-treated. The preliminary application rate of lime should be 5 percent by dry weight. The lime material should be calcium oxide, commonly known as quick-lime. The clayey soils should be at or near optimum moisture-condition during mixing operations. Additional testing is recommended to determine the appropriate application rate of lime prior to placement. These clayey soils will be suitable for reuse as General Engineered Fill provided they are cleansed of excessive organics, debris, and moisture-conditioned to at least 2 percent above optimum moisture. It is recommended that additional testing be performed on the on-site soils and fill material to evaluate the physical and index properties prior to reuse as Engineered Fill. The asphaltic concrete will not be suitable for reuse as Engineered Fill within the proposed building area. The asphaltic concrete may be used in pavement areas provided it is broken into fragments smaller than 4 inches in maximum dimension.

The preferred materials specified for Engineered Fill are suitable for most applications with the exception of exposure to erosion. Project site winterization and protection of exposed soils during the construction phase should be the sole responsibility of the Contractor, since he has complete control of the project site at that time.

Imported non-expansive Fill should consist of a well-graded, slightly cohesive, fine silty sand or sandy silt soil, with relatively impervious characteristics when compacted. This material should be approved by the Soils Engineer prior to use and should typically possess the following characteristics:

Percent Passing No. 200 Sieve	20 to 50
Plasticity Index	10 maximum
UBC Standard 29-2 Expansion Index	15 maximum

Fill soils should be placed in lifts approximately 6 inches thick, moisture-conditioned to a minimum of 2 percent above optimum moisture content, and compacted to achieve at least 90 percent of maximum density as determined by ASTM D1557. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

Drainage and Landscaping

The ground surface should slope away from building pad and pavement areas toward appropriate drop inlets or other surface drainage devices. In accordance with Section 1804 of the 2013 California Building Code, it is recommended that the ground surface adjacent to foundations be sloped a minimum of 5 percent for a minimum distance of 10 feet away from structures, or to an approved alternative means of drainage conveyance. Swales used for conveyance of drainage and located within 10 feet of foundations should be sloped a minimum of 2 percent. Impervious surfaces, such as pavement and exterior concrete flatwork, within 10 feet of building foundations should be sloped a minimum of 1 percent away from the structure. Drainage gradients should be maintained to carry all surface water to collection facilities and off-site. These grades should be maintained for the life of the project.

Slots or weep holes should be placed in drop inlets or other surface drainage devices in pavement areas to allow free drainage of adjoining base course materials. Cutoff walls should be installed at pavement edges adjacent to vehicular traffic areas these walls should extend to a minimum depth of 12 inches below pavement subgrades to limit the amount of seepage water that can infiltrate the pavements. Where cutoff walls are undesirable subgrade drains can be constructed to transport excess water away from planters to drainage interceptors. If cutoff walls can be successfully used at the site, construction of subgrade drains is considered unnecessary.

Utility Trench Backfill

Utility trenches should be excavated according to accepted engineering practice following OSHA (Occupational Safety and Health Administration) standards by a Contractor experienced in such work. The responsibility for the safety of open trenches should be borne by the Contractor. Traffic and vibration adjacent to trench walls should be reduced; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced; especially during or following periods of precipitation.

Sandy and gravelly soil conditions were encountered at the site. These cohesionless soils have a tendency to cave in trench wall excavations. Shoring or sloping back trench sidewalls may be required within these sandy and gravelly soils.

Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 90 percent of maximum density based on ASTM Test Method D1557. The utility trench backfill placed in pavement areas should be compacted to at least 90 percent of maximum density based on ASTM Test Method D1557. Pipe bedding should be in accordance with pipe manufacturer's recommendations.

United States Department of Agriculture

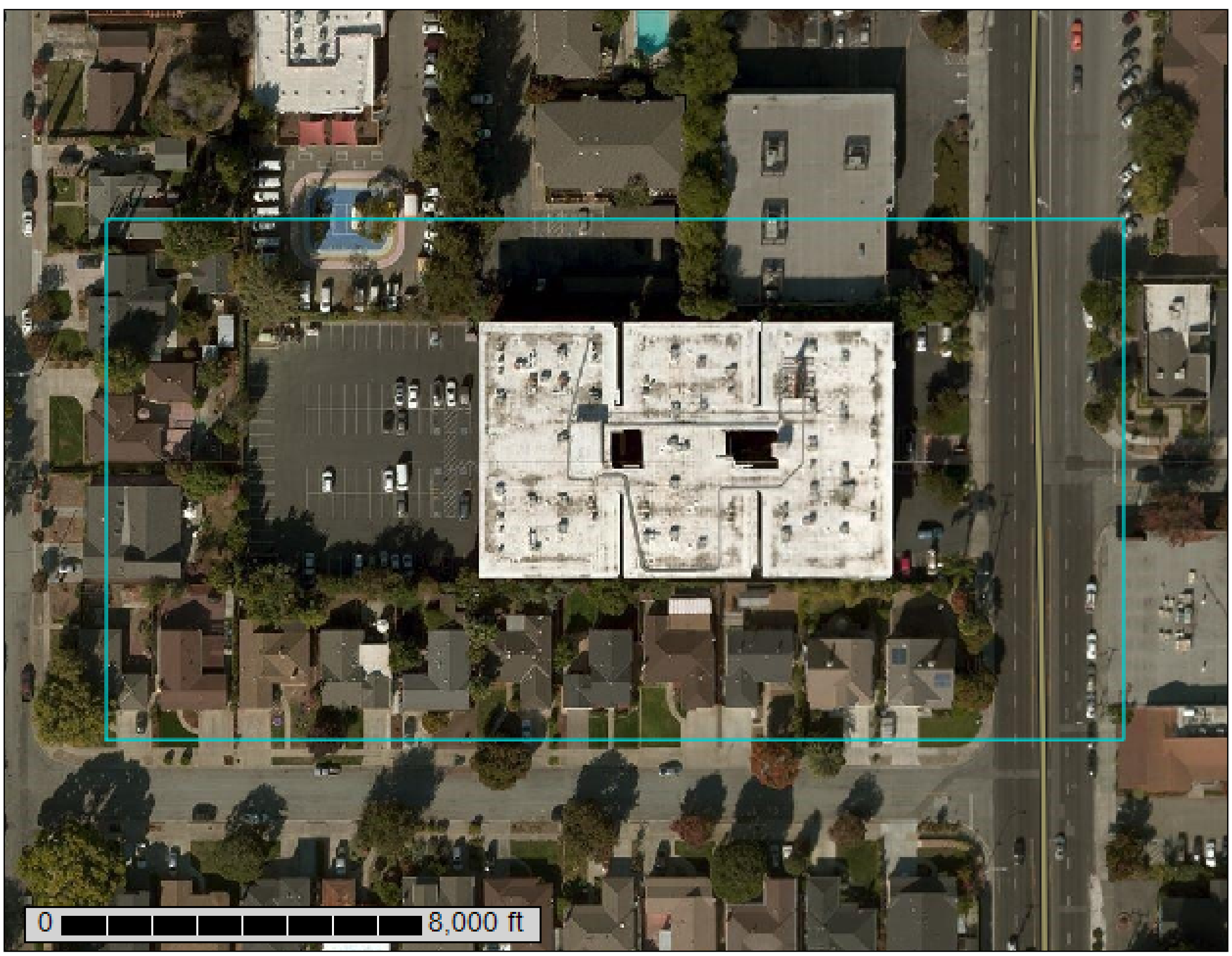
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Santa Clara Area, California, Western Part



June 19, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,090 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Clara Area, California, Western Part
Survey Area Data: Version 3, Sep 18, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 7, 2013—Nov 3, 2013

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Santa Clara Area, California, Western Part (CA641)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
140	Urban land-Flaskan complex, 0 to 2 percent slopes	1.4	28.4%
165	Urbanland-Campbell complex, 0 to 2 percent slopes, protected	3.6	71.6%
Totals for Area of Interest		**5.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Santa Clara Area, California, Western Part

140—Urban land-Flaskan complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1nszx
Elevation: 20 to 660 feet
Mean annual precipitation: 14 to 24 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 275 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent
Flaskan and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Disturbed and human transported material

Description of Flaskan

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from metamorphic and sedimentary rock and/or alluvium derived from metavolcanics

Typical profile

Ap - 0 to 2 inches: sandy loam
ABt - 2 to 7 inches: sandy clay loam
Bt1 - 7 to 17 inches: gravelly sandy clay loam
Bt2 - 17 to 31 inches: gravelly sandy clay loam
C - 31 to 59 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C

Minor Components

Pachic haploxerolls, loamy-skeletal

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Landelspark

Percent of map unit: 2 percent
Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Botella

Percent of map unit: 2 percent
Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Stevenscreek

Percent of map unit: 1 percent
Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

165—Urbanland-Campbell complex, 0 to 2 percent slopes, protected

Map Unit Setting

National map unit symbol: 1qsvl
Elevation: 0 to 240 feet
Mean annual precipitation: 14 to 24 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 275 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent
Campbell, protected, and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Disturbed and human-transported material

Description of Campbell, Protected

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from metamorphic and sedimentary rock and/or alluvium derived from metavolcanics

Typical profile

Ap - 0 to 10 inches: silt loam
A1 - 10 to 24 inches: silt loam
A2 - 24 to 31 inches: silty clay loam
A3 - 31 to 38 inches: silty clay loam
2A - 38 to 51 inches: silty clay loam
2Bw1 - 51 to 71 inches: silty clay
2Bw2 - 71 to 79 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C

Minor Components

Newpark

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Clear lake

Percent of map unit: 5 percent
Landform: Basin floors
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

References

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APPENDIX 5

BIOTREATMENT AREA CALCULATIONS AND BACK-UP DATA

RICK ENGINEERING COMPANY

Preliminary Biotreatment Area Calculations

Job Name: Santana Terrace
Job Number: 17271-B
Date: 6/19/2015

Mean Annual Precipitation (in)	14.9

MAP Correction Factor	1.072

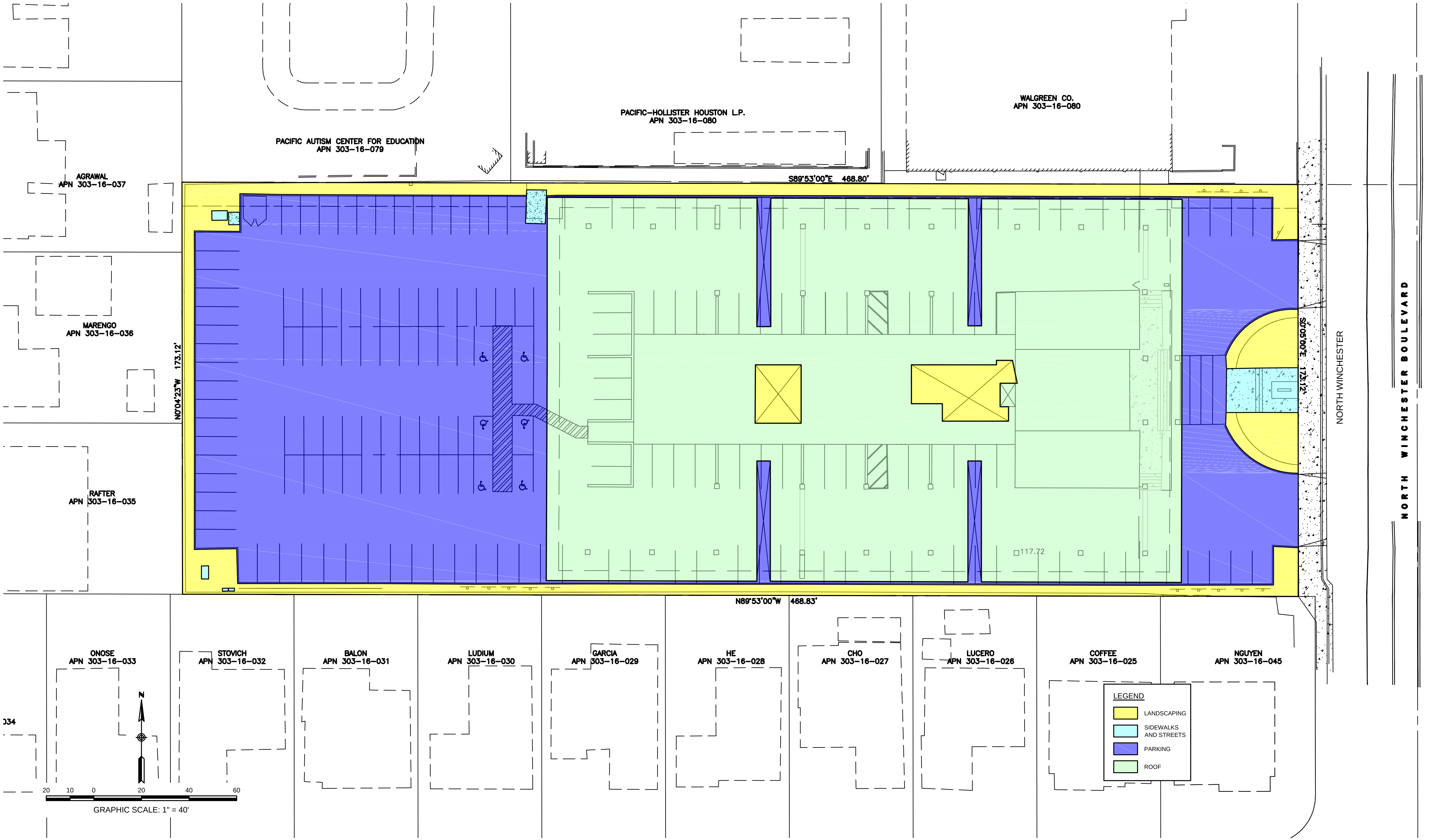
Land Use Type	Runoff Coefficient
Open Space/Parks	0.10
Pavement/Concrete	0.80
Roof	0.90

Assumed Intensity (in/hr)	0.2

Planter Data - Type 1	
Soil Infiltration Rate (in/hr)	5
Ponding Depth (in)	6
Growing Media Depth (in)	18
Growing Media Void Ratio	0.15
Gravel Depth (in)	12
Storage Volume per SqFt (cuft)	0.73

Basin	Area (sqft) Open Space/Parks	Area (sqft) Pavement/ Concrete	Area (sqft) Roof	Total Area (ac)	Percent Impervious (%)	Unit Basin Volume for 80% Capture (in)	Equivalent Impervious Area[2] (sqft)	Water Quality Design Volume (cuft)	Duration of the Rain Event (hr)	Volume Filtered per SqFt (cuft)	Planter Type	Total Volume Filtered and Volume Stored per SqFt (cuft)	Area Required to Treat the WQD Volume (sqft)	Area Provided (sqft)	Excess Area Provided (sqft)
1	1277	8184	8004	0.40	93	0.60	15421	774.2	3.0	1.26	1	1.98	391.0	409.0	18.0
2	1082	8085	6838	0.37	93	0.60	14145	710.1	3.0	1.26	1	1.98	358.6	377.2	18.5
3	644	874	50	0.04	59	0.47	898	35.0	2.3	0.97	1	1.70	20.6	24.0	3.4
4	520	998	127	0.04	68	0.50	1072	44.6	2.5	1.04	1	1.77	25.3	28.0	2.7
5	2185		7391	0.22	77	0.53	7634	339.6	2.7	1.11	1	1.84	184.8	188.0	3.2
6			11326	0.26	100	0.62	11326	586.8	3.1	1.30	1	2.02	290.5	361.8	71.3
7	1064	3032	8066	0.28	91	0.59	10879	538.4	3.0	1.24	1	1.96	274.4	285.0	10.6
8	731	2643	4423	0.18	91	0.59	6853	339.1	3.0	1.24	1	1.96	172.8	177.0	4.2
9	899	1025	378	0.05	61	0.48	1389	55.1	2.4	0.99	1	1.72	32.1	34.0	1.9
10	507	587	221	0.03	61	0.48	800	31.7	2.4	0.99	1	1.72	18.5	20.0	1.5
Total	8909	25428	46823	1.86	89	--	--	3454.6	--	--	--	--	1768.6	1903.9	135.4

Design Standards:
Santa Clara County, California - Drainage Manual (2007)
Santa Clara Valley Urban Runoff Pollution Prevention Program - C.3 Stormwater Handbook (April 2012)
1 - Table 5-4 - Estimated Runoff Coefficients for Various Surfaces During Small Storms
2 - Contributing pervious area converted to equivalent impervious area using the runoff coefficient factors



PRELIMINARY EXISTING CONDITION LAND USE FOR THE SANTANA TERRACE PROJECT

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J-17271-B
DATE: JUNE 19, 2015

SHEET 1 OF 1

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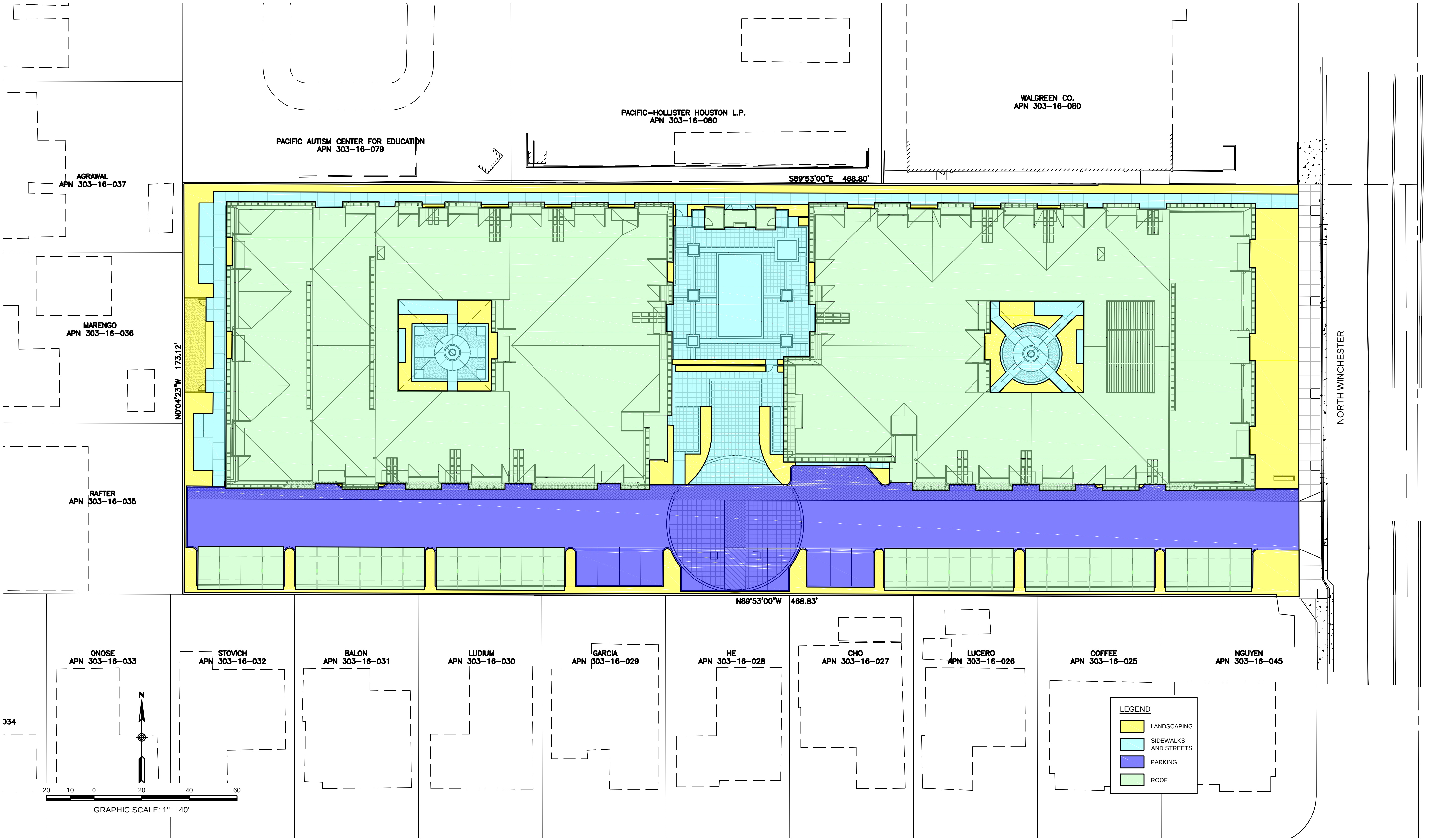

PRELIMINARY PROPOSED CONDITION LAND USE FOR THE SANTANA TERRACE PROJECT

SHEET 1 OF 1

J-17271-B
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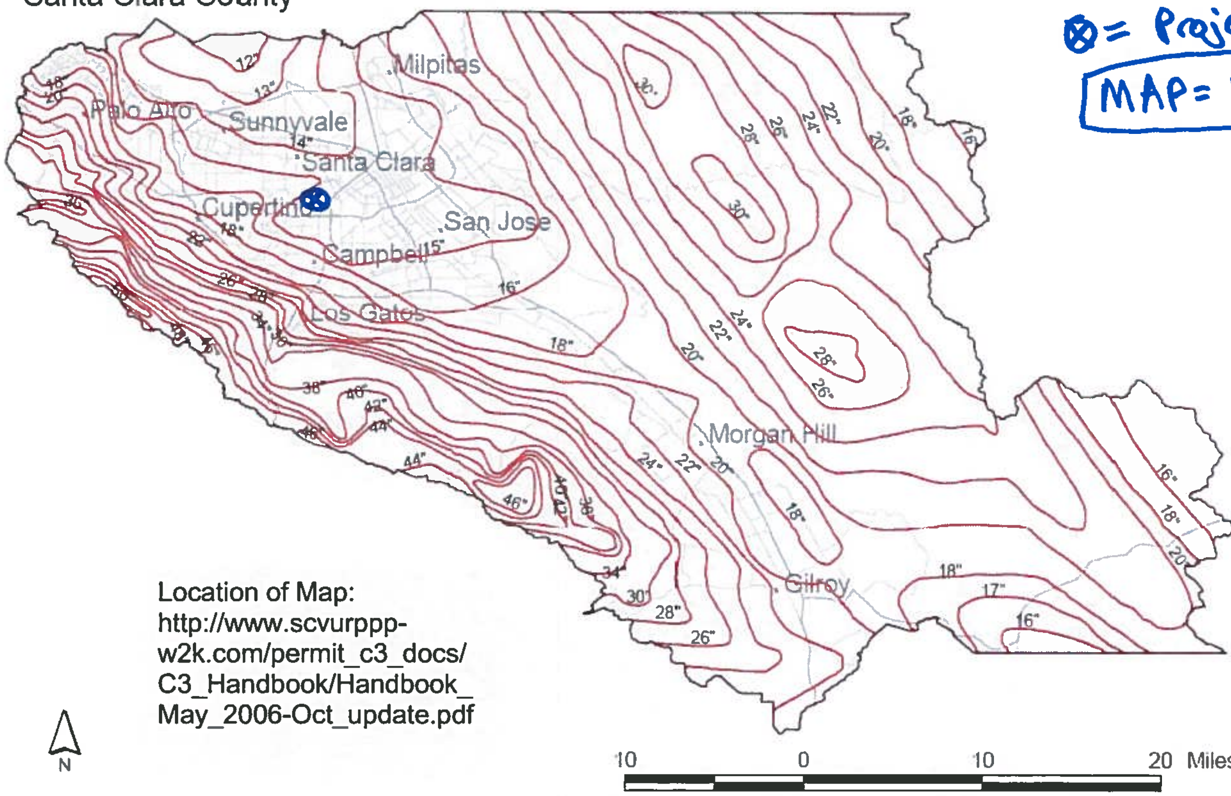
REC DPW COLOR.ctb

17271-B Santana Terrace SWMP 6/18/15

Mean Annual Precipitation Determination.

Figure A-2
Mean Annual Precipitation Map
Santa Clara County



⊗ = Project Location

MAP = 14.9 inches.

SOURCE: Santa Clara Valley Water District, Mean Annual Precipitation Map, San Francisco & Monterey Bay Region, 1998

Figure A-2: Mean Annual Precipitation, Santa Clara County

APPENDIX 6

BIOTREATMENT AREAS WORKMAP

PRELIMINARY BIOTREATMENT AREAS FOR THE SANTANA TERRACE PROJECT

SHEET 1 OF 1

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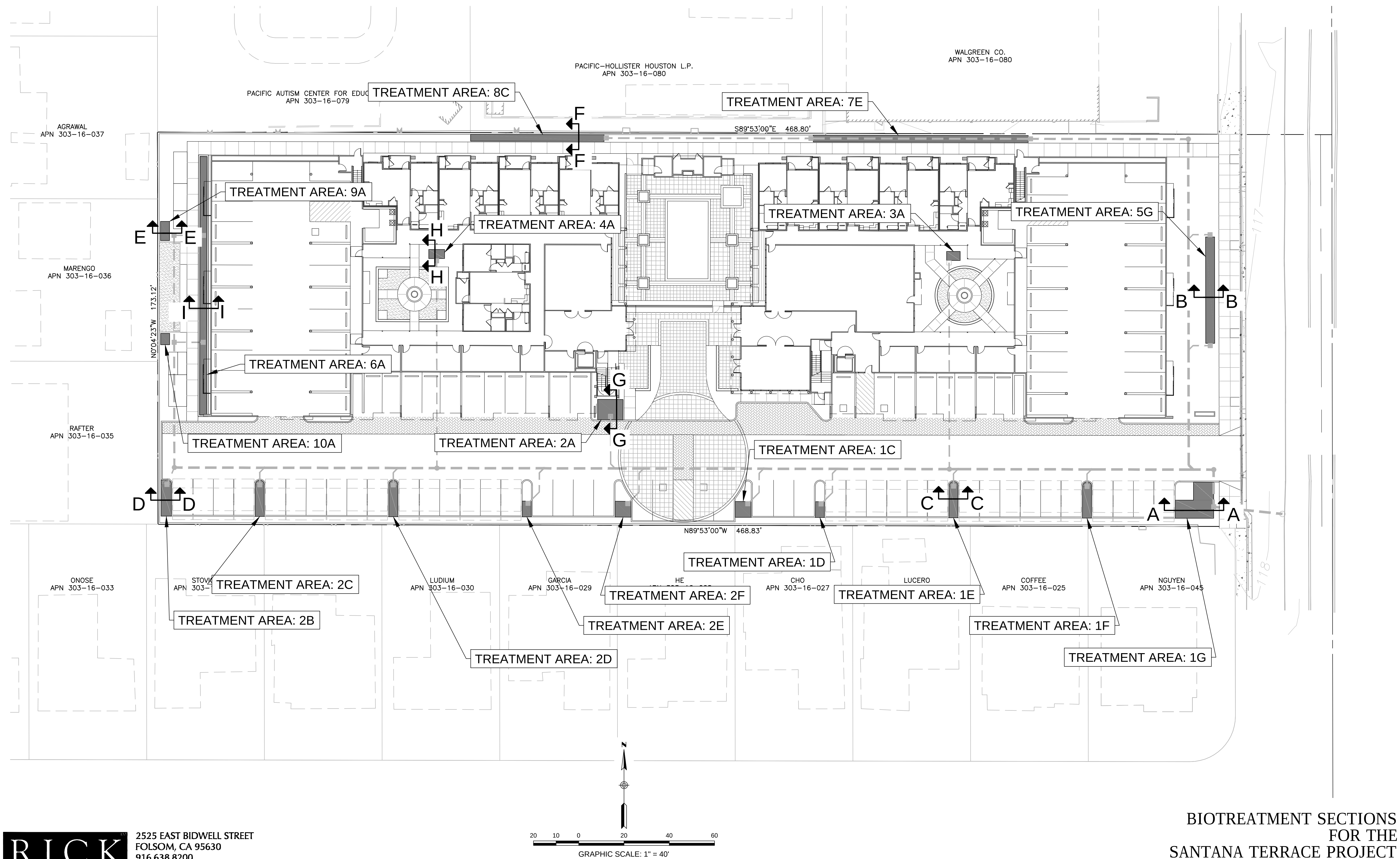
DPW Full Size.ctb

APPENDIX 7

BIOTREATMENT AREA CROSS SECTIONS



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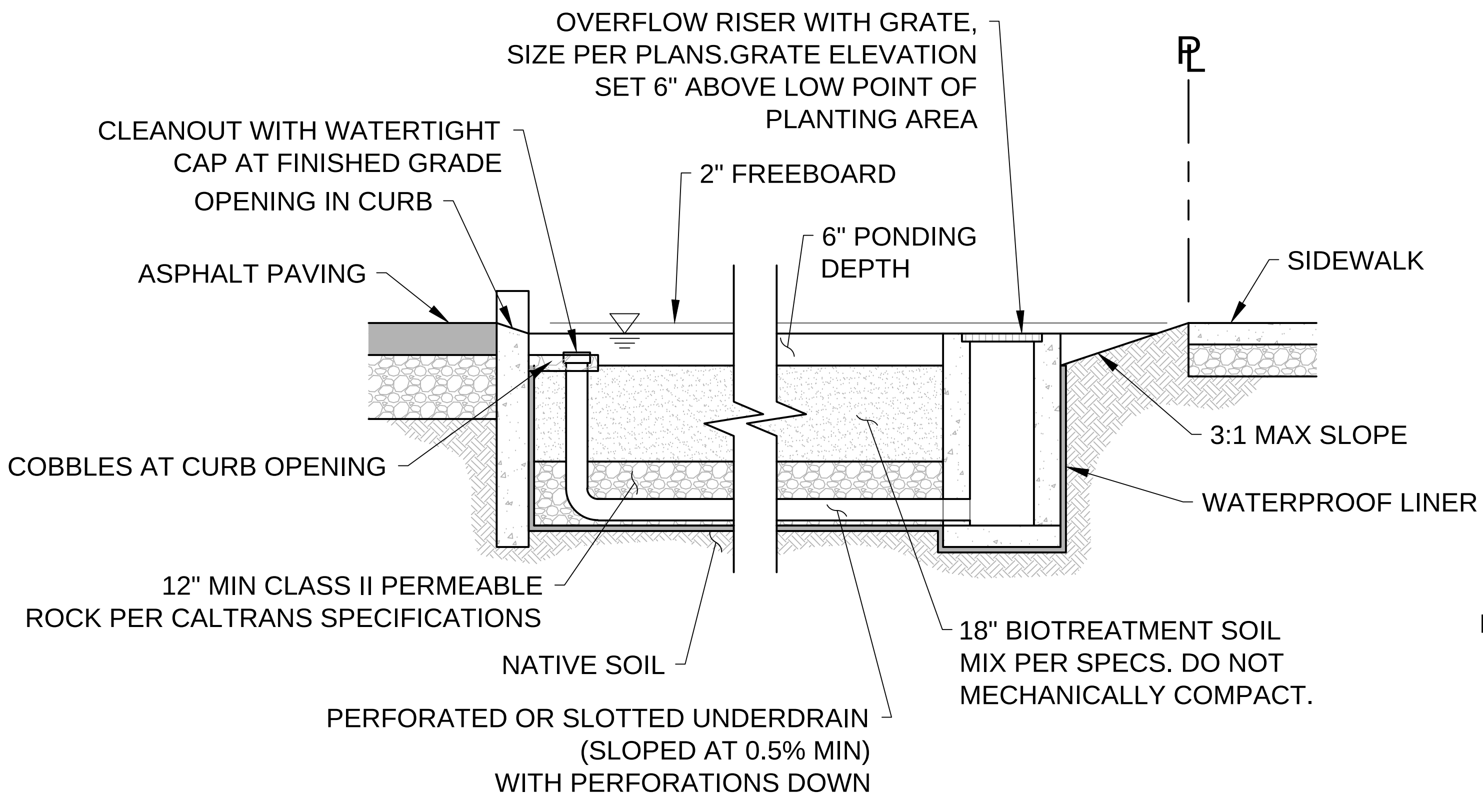
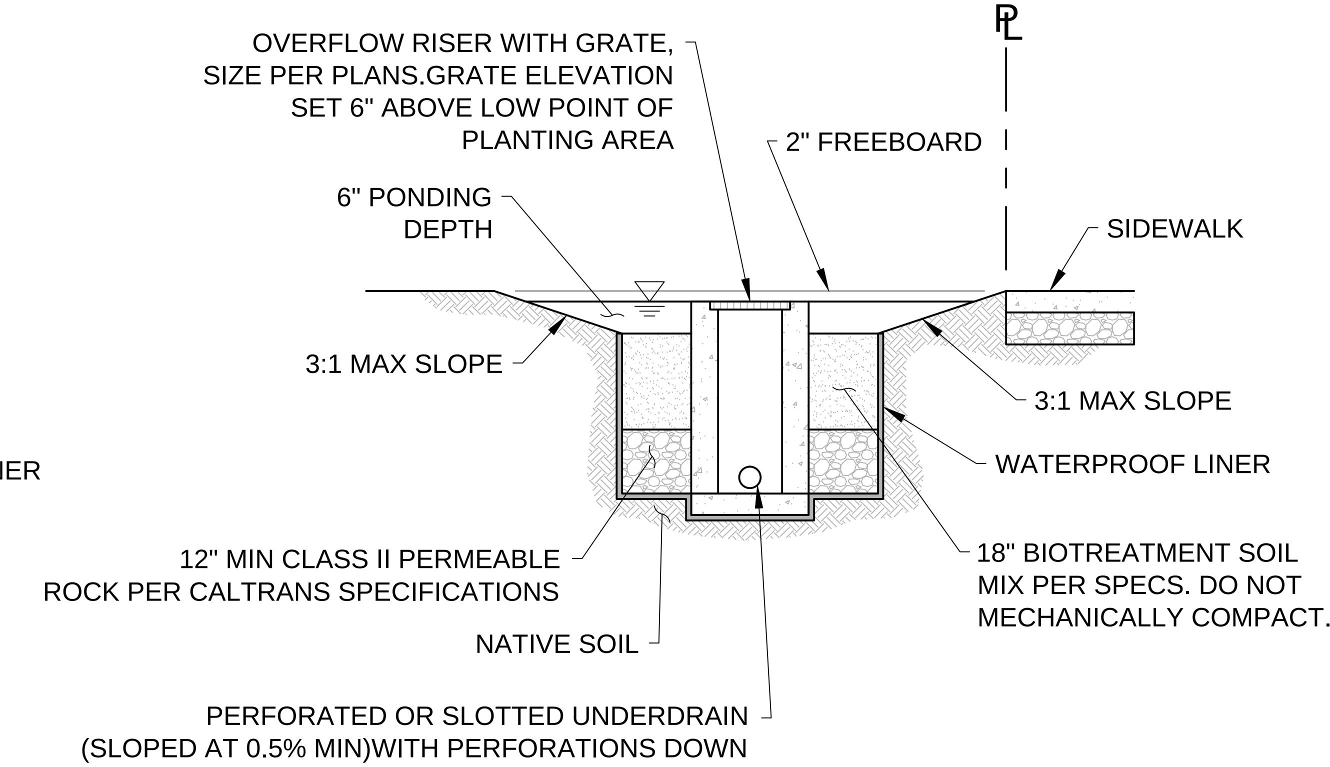
BIOTREATMENT SECTIONS FOR THE SANTANA TERRACE PROJECT

SHEET 1 OF 4

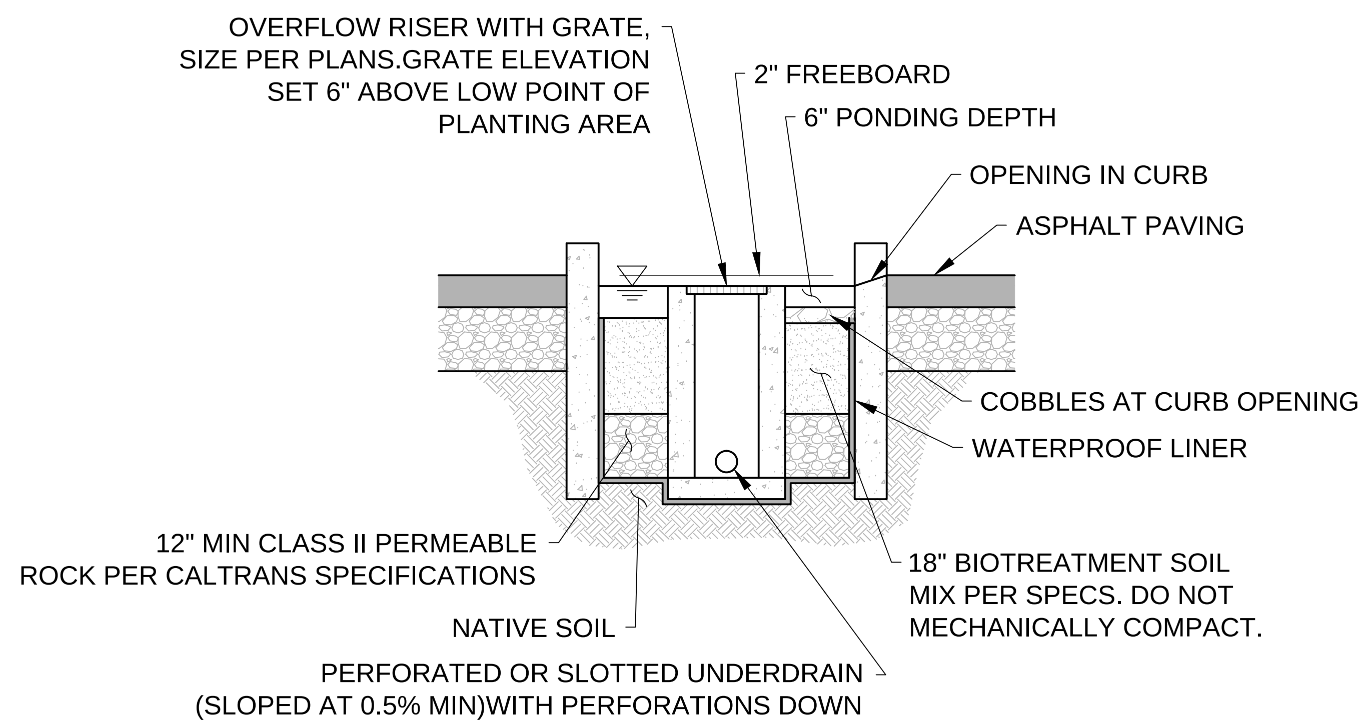
J-17271-B
DATE: JUNE 22, 2015



SECTION A-A: TREATMENT AREA: 1G



SECTION B-B: TREATMENT AREA: 5G



SECTION C-C: TREATMENT AREAS: 1C,
1D, 1E, 1F, 2C, 2D, 2E, 2F

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BIOTREATMENT SECTIONS
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SHEET 2 OF 4

J-17271-B
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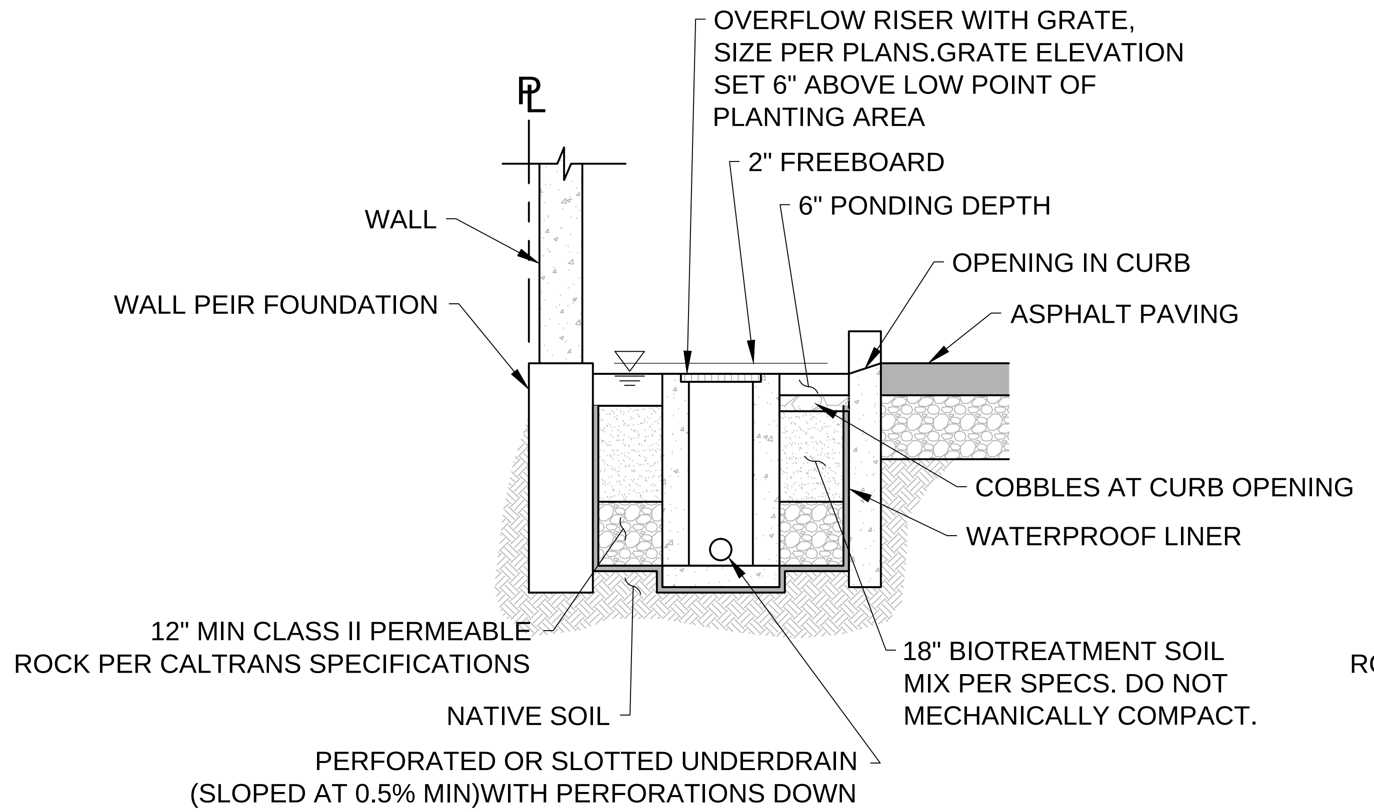
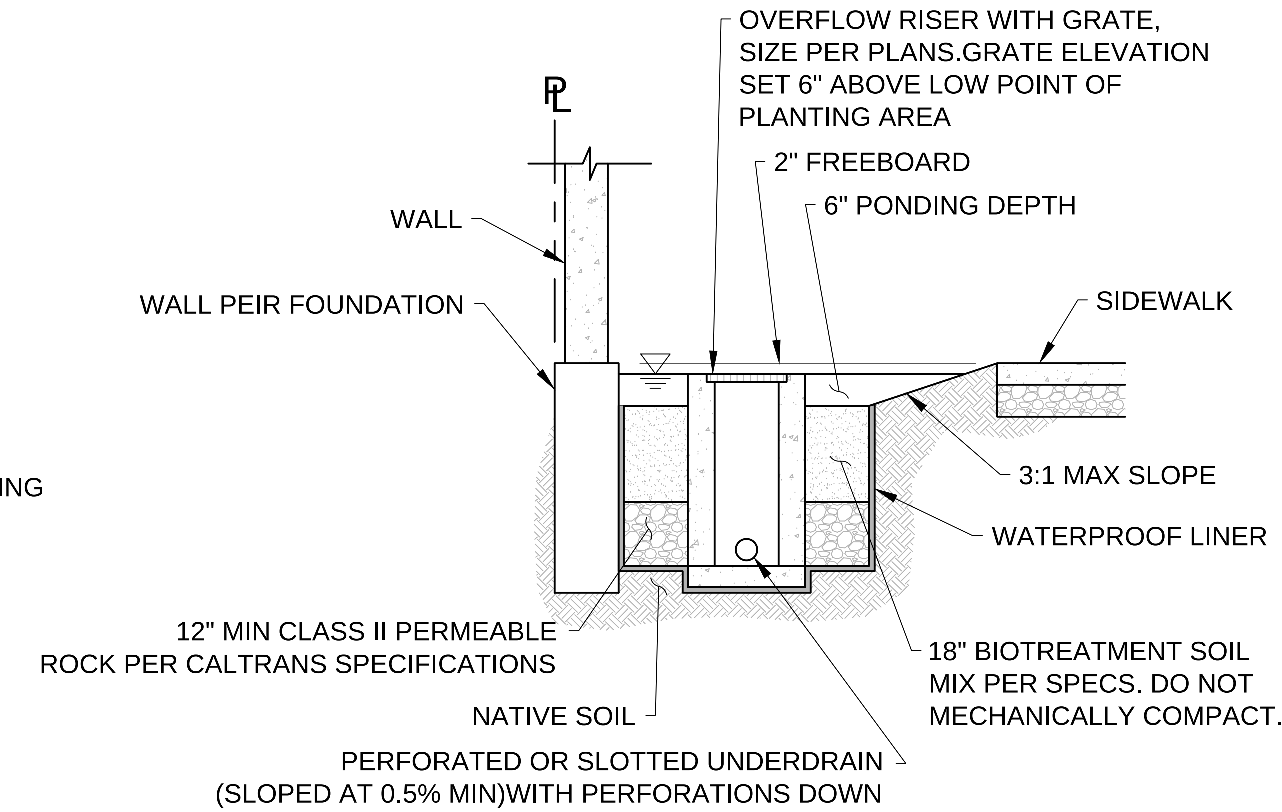
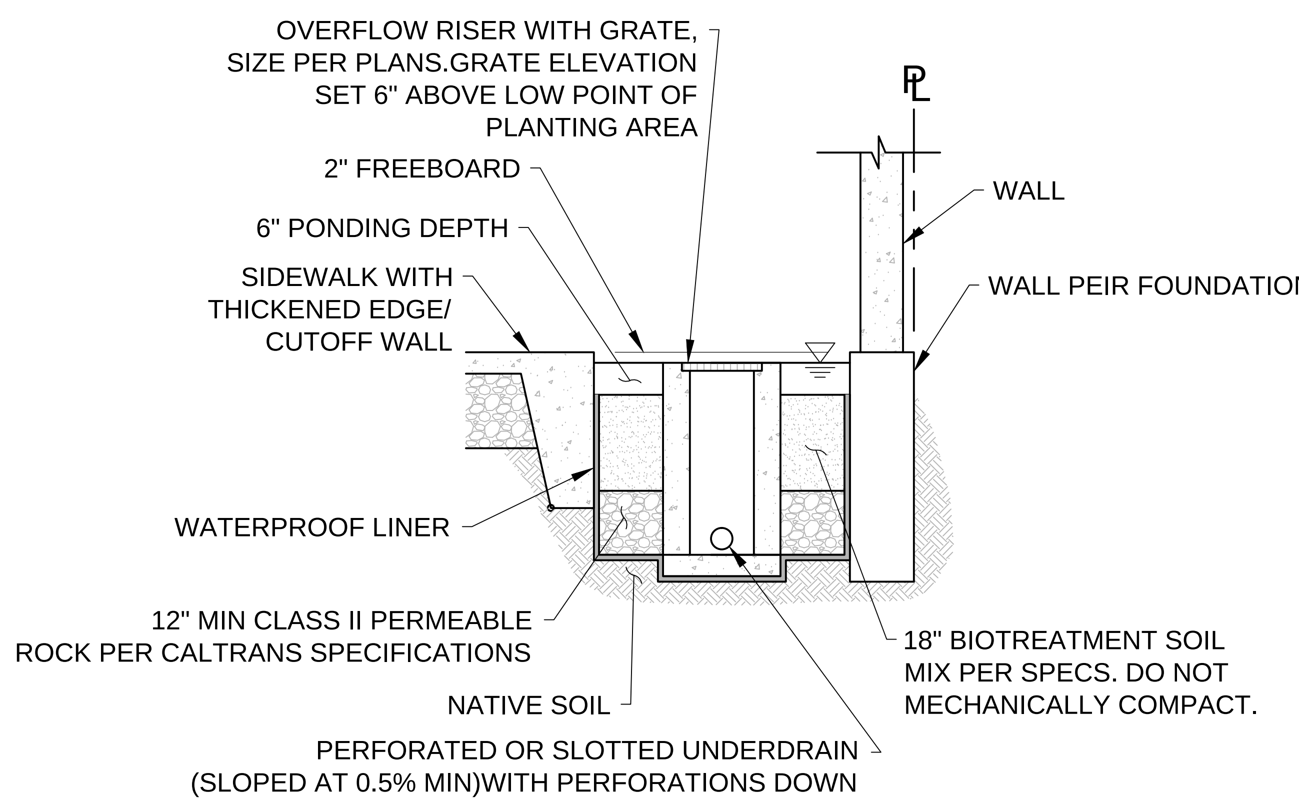


SECTION D-D: TREATMENT AREA: 2B



SECTION E-E: TREATMENT AREAS: 9A, 10A



SECTION F-F: TREATMENT AREAS: 7E, 8C

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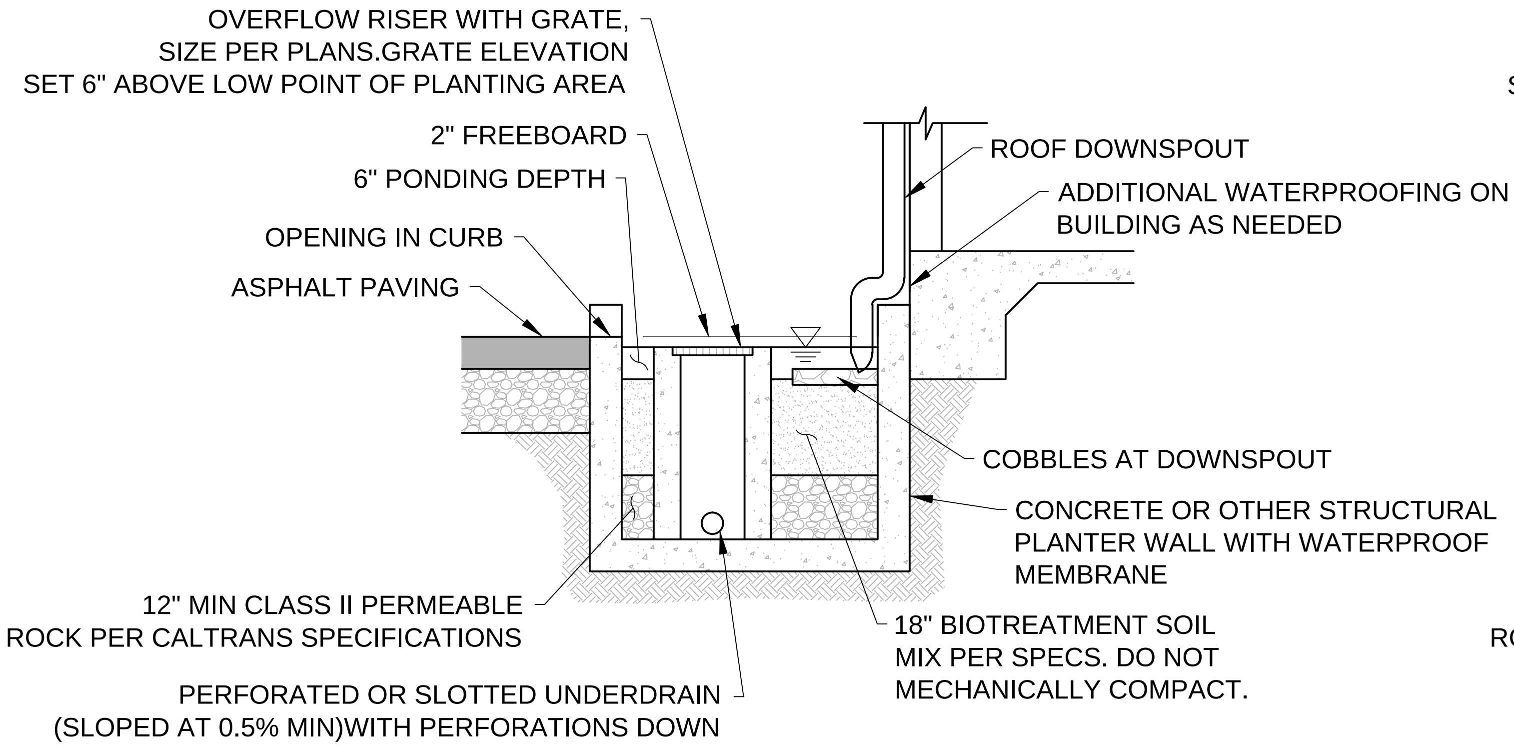
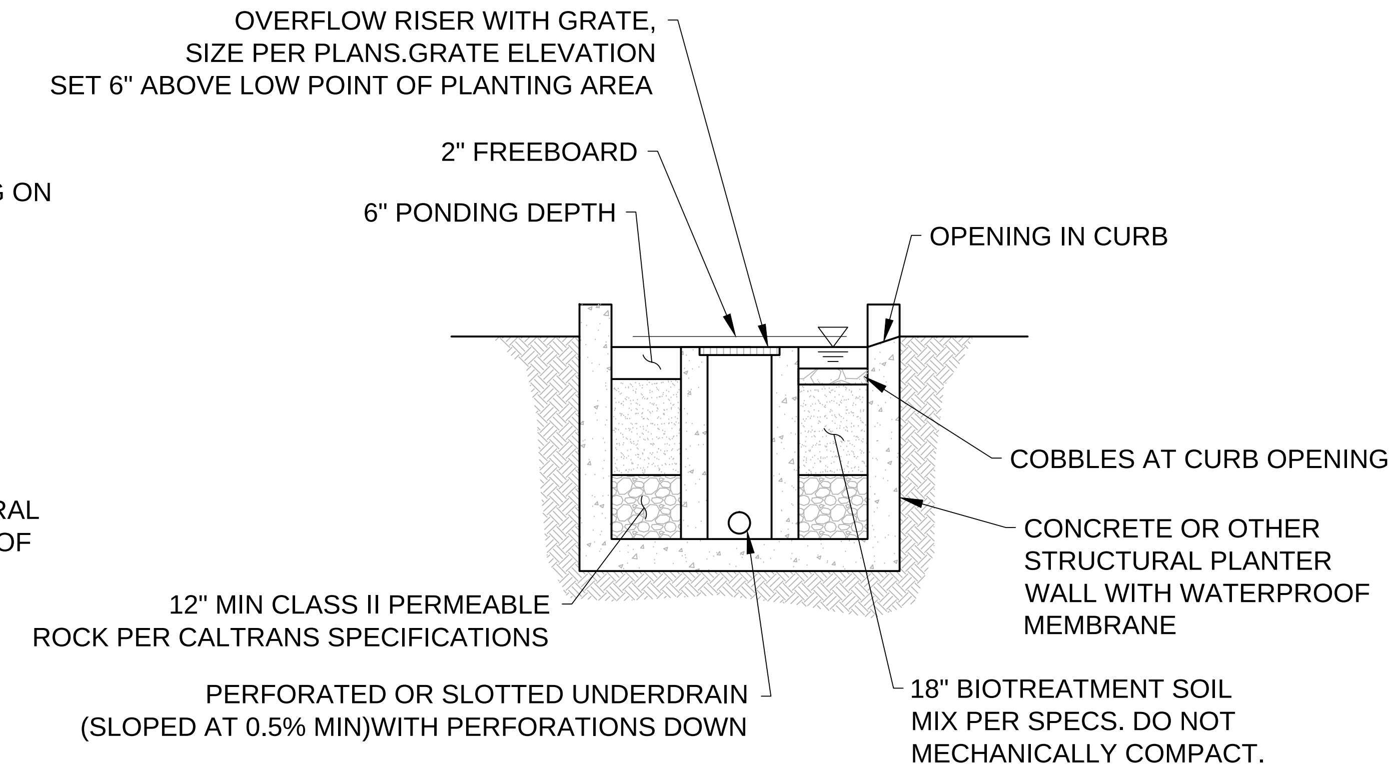
BIOTREATMENT SECTIONS
FOR THE
SANTANA TERRACE PROJECT

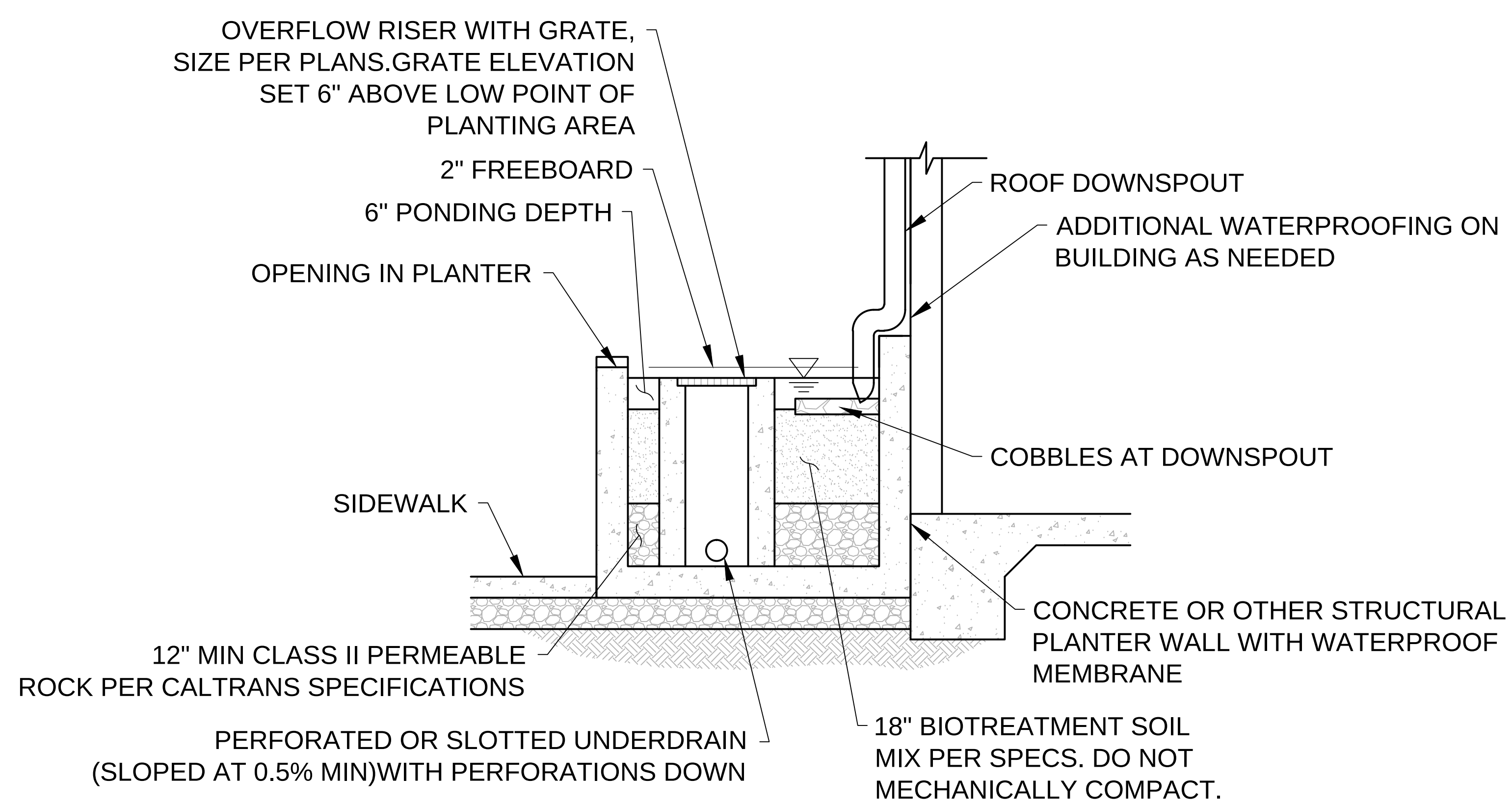
J-17271-B
DATE: JUNE 22, 2015



SECTION G-G: TREATMENT AREA: 2A



SECTION H-H: TREATMENT AREAS: 3A, 4A



SECTION I-I: TREATMENT AREA: 6A

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BIOTREATMENT SECTIONS
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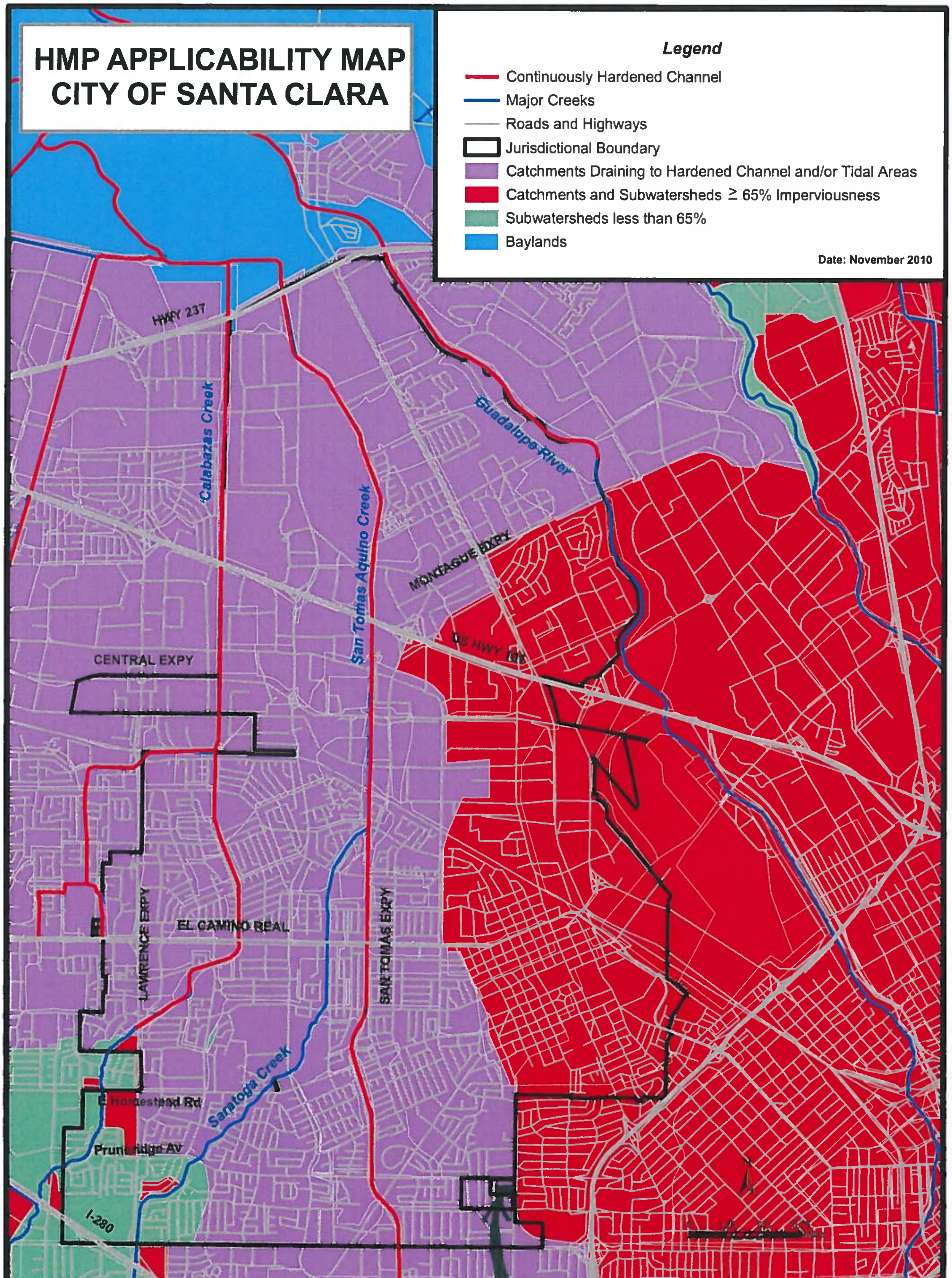
DATE: JUNE 22, 2015

APPENDIX 8

HYDROMODIFICATION MANAGEMENT APPLICABILITY MAP

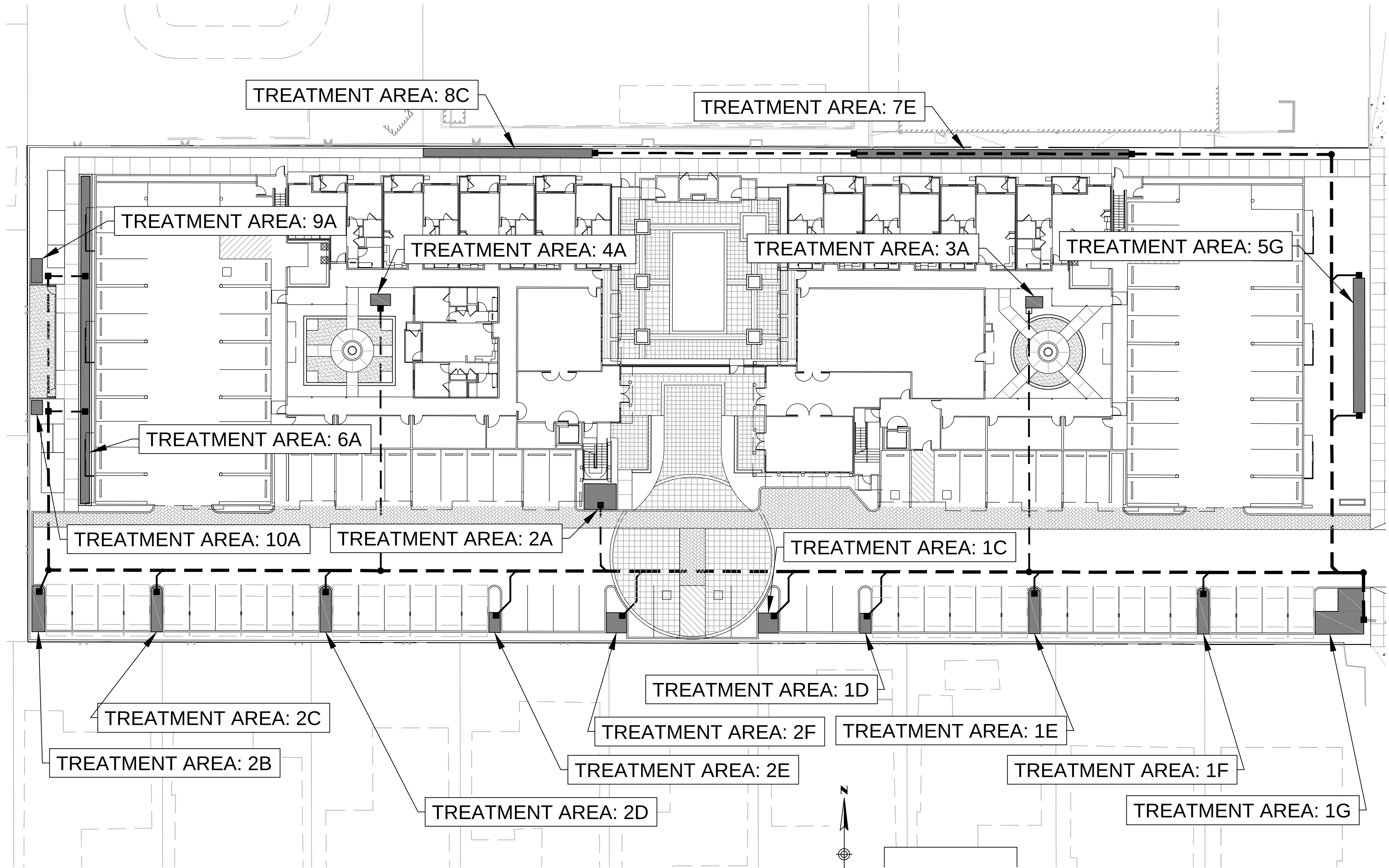
17271-B SWMP for Santana Terrace 6/18/15



Approx. Project Location

APPENDIX 9

SAMPLE MAINTENANCE FORM



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BIOTREATMENT AREAS FOR THE SANTANA TERRACE PROJECT

J-17271-B
DATE: JUNE 22, 2015

SHEET 1 OF 1

Santa Clara Valley Urban Runoff Pollution Prevention Program

Standard Stormwater Treatment BMP Inspection Data Collection Form

Date: ____________ Time: ____________ File Number: ____________

Municipality______________________ Agency or Department: ______________________

Inspectors ____

I. REASON FOR INSPECTION

☐ Initial ☐ Follow-up ☐ Other ____________________

☐ Routine ☐ Response to Complaint Inspection Frequency: ____________

II. PROJECT INFORMATION

1. ID # or Assessor Parcel Number: ____________ 2. Date of Installation ____________
3. Project Type: ☐Residential ☐Commercial ☐Industrial ☐Multi-use ☐Road ☐Institutional ☐Other
4. Facility Name: ______________________________
   Site Address: ______________________________
   Contact Name: ______________________ Phone: ____________
5. If the property owner is different than the contact name, fill out information below:
   Owner Name: ______________________ Title: ____________
   Owner's Address: ______________________ Phone: ____________
6. If the BMP operator is different than the contact name, fill out information below:
   Name: ______________________ Title: ____________
   Address: ______________________ Phone: ____________
7. Maintenance Documentation: ☐Reviewed ☐Not Reviewed ☐Not Available ☐Other: ____________
8. Party responsible for O&M Documentation: ☐Property owner ☐BMP Operator ☐Contractor ☐Other: ____________

III. BMP TYPE AND INSPECTION RESULTS (Use Codes from "Potential Inspection Results with Definitions" sheet)

1. **Biofiltration**

☐ Vegetated Swale ____________
☐ Vegetated Buffer Strip ____________
☐ Bioretention ____________
☐ Roof Gardens ____________
☐ Planter Boxes ____________

Detention

☐ Extended Detention Basin ____________
☐ Wet Pond ____________
☐ Wetland ____________

Structural

☐ Drain Insert ____________
☐ Porous Pavement ____________
☐ Media Filter ____________
☐ Hydrodynamic Separator ____________
☐ Vortex Separator ____________
☐ Water Quality Inlet ____________
☐ Underground Detention Systems ____________
☐ Wet Vault ____________

Infiltration

☐ Infiltration Basin ____________
☐ Infiltration Trench ____________
☐ Exfiltration Trench ____________
☐ Retention/Irrigation ____________

Other (describe): ____________

☐ ____________

____

____

2. Is maintenance needed at this time? ☐Yes ☐No 3. ***Mosquitoes or Mosquito Larvae Present?** ☐Yes ☐No
4. Comments/Notes: ______________________________

IV. FOLLOW-UP AND ENFORCEMENT ACTIONS (Add additional information on back)

1. Describe corrective actions needed: ______________________________
2. Describe materials distributed (brochures, BMPs, etc.): ____________
3. Describe Enforcement Action:

   ☐ None ☐ Verbal Notice ☐ Warning Notice
   ☐ Administrative Action ☐ Administrative Action with Penalty/Fine ☐ Civil Action
   ☐ Criminal Action ☐ Referral for Enforcement ____________

4. Follow-up required? ☐Yes ☐No ☐Comments ____________
5. Priority for reinspection: ☐High ☐Medium ☐Low
6. Return inspection needed? ☐Yes ☐No ☐Comments ____________
7. Required Compliance Date: ____________ Date Corrected: ____________

Facility Representative: ____________ **Inspector:** ____________

Standard Stormwater Treatment BMP Inspection Data Collection Form

Background Data for BMP Type

The *Standard Stormwater Treatment BMP Inspection Data Collection Form* (Inspection Form) lists twenty stormwater treatment BMP types (see Section III). Inspectors, data entry staff and others who use the Inspection Form can refer to the California Stormwater Quality Association (CASQA) and SCVURPPP Fact Sheets for background information. The CASQA Fact Sheets are numbered (see below) and are located in the CASQA *Stormwater BMP Handbook for New Development and Redevelopment,* as well as SCVURPPP's *C3. Stormwater Handbook*. The SCVURPPP Fact Sheets are also located in the *C3. Stormwater Handbook.* Both Handbooks are available online.

<u>CASQA Reference Number</u>
Bioretention TC-32
Drain Insert MP-52
Extended Detention Basin TC-22
Infiltration Basin TC-11
Infiltration Trench TC-10
Media Filter TC-40 and MP-40
Retention/Irrigation TC-12
Vegetated Buffer Strip TC-31
Vegetated Swale TC-30
Vortex Separator MP-51
Water Quality Inlet TC-50
Wet Pond TC-20
Wetland MP-20
Wet Vault MP-50

<u>SCVURPPP Fact Sheets</u> (no identification numbers)
Exfiltration Trench
Hydrodynamic Separator
Planter Boxes
Porous Pavement
Roof Gardens
Underground Detention Systems

Potential Inspection Results with Definitions

If mosquitoes or mosquito larvae are observed within a BMP, report condition to: Santa Clara County Vector Control District, 976 Lenzen Ave., San Jose, CA 95126; phone: 408-918-4470; ask for a vector control technician; website: www.sccvector.org

ID	Inspection Results	Definitions
I. All BMP Types		
1	No Visible/Apparent Problems	No visible or apparent problems with BMP function. BMP appears to be well-maintained
2	Significant Engineering/Design Flaws	BMP observed to have significant engineering/design flaws which lessen its effectiveness as a stormwater treatment measure.
3	Unauthorized Modifications	Any modification that lessens the effectiveness of the BMP; any modification not authorized by the City, designated agency or other regulatory agency.
4	BMP Destroyed or Eliminated	BMP destroyed, removed or eliminated from property.
5	Trash/Debris Accumulation or Dumping	Trash & debris accumulates within and/or on BMP; trash & debris interferes with proper BMP function; visual evidence of trash/debris dumping.
6	Evidence of Contaminants & Pollution	Evidence or presence of oil, gasoline, contaminants or other pollutants.
7	BMP Access Obstructed	Access to BMP obstructed or limited.
8	Obnoxious Odors	Unpleasant odors within/from the BMP.
9	Fencing - Missing or Broken Bars	Any defect in or damage to the fence or gate that permits easy entry to a facility.
10	BMP Cannot Be Located	BMP cannot be located for inspection.
II. Biofiltration (Bioretention, Vegetated Buffer Strip, Vegetated Swale, Roof Gardens, Planter Boxes)		
A. General		
11	Uneven or Clogged Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed across the BMP.
12	Leaking or Malfunctioning Irrigation System	Irrigation system leaking or malfunctioning.
B. Sediment and Erosion Problems		
13	Sediment Accumulation	Sediment depth exceeds 2 inches on more than 10% of the vegetated treatment area; or sediment interferes with BMP performance.
14	Erosion/Scouring	Eroded or scoured areas due to flow channelization, higher flows, wind or water.
C. Vegetation Maintenance Issues		
15	Poor Vegetation Coverage	Planted vegetation is sparse or bare or eroded patches occur in more than 10 % of the BMP. Growth of planted vegetation is poor because sunlight does not reach swale.
16	Invasive/Nuisance Vegetation or Weeds	Planted vegetation is excessively tall; nuisance weeds, invasive or noxious vegetation are overgrown; vegetation reduces free movement of water through BMP.
17	Tree/Brush Growth	Growth does not allow maintenance access or interferes with maintenance activity.
D. Drainage Problems		
18	Standing Water/Excessive Ponding/Soggy Soil	Water is observed within the BMP (between storms) and appears not to drain freely or soil is excessively soggy. Excessive ponding of water within vegetated swale or other BMP.
19	Mosquito Habitat	Suitable habitat exists for mosquito production (e.g., standing water for more than 72 hours in areas accessible to mosquitoes).
20	Clogged or Obstructed Inlets/Outlets	Inlet/outlet clogged or obstructed with sediment and/or debris.
21	Constant Baseflow/Damage	Small quantities of water flow through the vegetated swale, even when it has been dry for weeks, and an eroded, muddy channel has formed in the swale bottom; constant baseflow from irrigation runoff..
III. Detention and Infiltration (Extended Detention Basin, Wet Pond, Wetland, Exfiltration Trench, Infiltration Basin, Infiltration Trench, Retention/Irrigation)		
A. Vegetation Maintenance Issues		
22	Invasive/Nuisance Vegetation or Weeds	Invasive, nuisance vegetation or weeds are present.
23	Tree/Brush Growth & Hazard Trees	Growth does not allow maintenance access or interferes with maintenance activity; dead, diseased or dying trees; tree growth on berms or emergency spillway >4 feet in height or covering more than 10 % of spillway.
B. Sediment and Erosion Problems		
24	Sediment Accumulation	Detention BMPs- sediment on pool bottom preventing water flow in/out of the facility. Infiltration BMPs -Sediment in storage areas, rock filters, and pre-settling ponds and vaults preventing infiltration.
25	Erosion	Eroded damage over two inches deep; potential for continued erosion; any erosion on a compacted berm embankment; soil from adjacent areas washes into/on BMP; continued erosion is prevalent.
C. Animal Pests		
26	Rodent Holes	If facility acts as a dam or berm, any evidence of rodent holes, or any evidence of water piping through dam or berm via rodent holes.
27	Insects (Wasps, Hornets, Bees)	Insects (wasps, hornets, bees) interfere with maintenance activities. Excessive or nuisance levels.
D. Drainage Problems		
28	Standing Water/Excessive Ponding/Soggy Soil	Water is observed within the BMP (between storms) and appears not to drain freely or soil is excessively soggy. Excessive ponding of water within vegetated swale or other BMP.
29	Mosquito Habitat	Suitable habitat exists for mosquito production (e.g., standing water for more than 72 hours in areas accessible to mosquitoes).
30	Empty Cell	First cell of wet pond does not hold water.
31	Unlevel Berm Surface	Unlevel internal berm dividing wet pond cells

Potential Inspection Results with Definitions

ID	Inspection Results	Definitions
III. Detention and Infiltration (Extended Detention Basin, Wet Pond, Wetland, Exfiltration Trench, Infiltration Basin, Infiltration Trench, Retention/Irrigation) continued		
E. Unique to Certain BMPs		
32	Uneven or Clogged Flow Spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed across the BMP.
33	Oil Sheen on Water (Wet ponds)	Prevalent and visible oil sheen.
34	Damaged/Missing Bars (Debris Barriers)	Bars are missing, loose, bent out of shape, or deteriorating due to excessive rust.
35	Leaking or Malfunctioning Irrigation System	Irrigation system leaking or malfunctioning.
36	Embankment Settlement Lower Than Design Elevation	Embankment settlement four inches lower than the design elevation.

ID	Inspection Results	Definitions
IV. Structural, Non-landscaped Based (Drain Insert, Hydrodynamic Separator, Media Filter, Porous Pavement, Vortex Separator, Wet Vault, Water Quality Inlet, Underground Detention Systems)		
A. General		
37	Mosquito Habitat	Suitable habitat exists for mosquito production (e.g., standing water for more than 72 hours in areas accessible to mosquitoes).
38	Access Cover Damaged/Difficult to Remove/Not in Place	Cover cannot be opened, corrosion/deformation of cover; maintenance person cannot remove cover using normal lifting pressure; cover is missing or only partially in place.
39	Deteriorating Paint or Protective Coating	Part or parts that have a rusting or scaling condition and have affected structural adequacy.
40	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids).
B. Ineffective Filter Material, Liners and/or Membranes		
41	Sediment Accumulation	Sediment depth exceeds acceptable levels (varies between BMPs)
42	Ineffective Media Insert/Filter Media	Media inset/filter media ineffective in doing intended function and needs to be replaced; filter is beyond the typical average life of product.
43	Rock Lining Out of Place/Missing (Sand Filters)	Soil beneath the rock lining is visible.
44	Visible Liner with Holes or Damaged	Liner is visible and has more than three 1/4-inch holes in it or is damaged.
45	Compromised Membrane or Roof Structure	Membrane or roof structure is compromised by either roots and/or water discharge.
46	Short Circuiting	Flows do not properly enter filter cartridges (media filters); seepage/flows occur along the vault walls and corners (sand filters); Sand eroding near inflow area (sand filters); flows become concentrated over one section of the sand filter rather than disperse (sand filters).
C. Pipe or Pipe Joint Problems		
47	Damaged Pipes	Any part of the piping that is crushed, deformed, damaged, in need of repair or any other failure to the piping; protective coating is damaged.
48	Missing Debris Barrier/Not Attached to Pipe	Entire barrier is missing or is not attached to pipe.
49	Sediment in Drain Pipes/Cleanouts	Drain pipes and/or cleanouts are full of sediment and/or debris.
50	Joints Between Tanks/Pipe Section	Any openings or voids allowing material to be transported into facility.
51	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10 % of its design shape.
D. Underground Vaults/Containers, Chambers, Tanks Issues		
52	Sediment Accumulation	Sediment depth exceeds acceptable levels (varies between BMPs), 20 % of the diameter of the pipe/design depth or interferes with proper BMP function.
53	Vault Structure Damage	Vault structures which are observed to have cracks in walls, bottom damage to frame and/or top slab.
54	Damaged Baffles and/or Weir	Baffles which are corroded, cracked, warped and/or showing signs of failure as determined by maintenance person. Weir is observed to be damaged by maintenance person.
55	Access Ladder Damage	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structural wall, missing rungs, has cracks and/or is misaligned.
56	Oil Accumulation (Water Quality Inlet, Vortex Separator)	Oil accumulations that exceed 1-inch at the surface of the water.
57	Blocked, Damaged or Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.
E. Unique to Certain BMPs		
58	Damaged Coalescing Plates (Water Quality Inlet)	Plate media broken, deformed, cracked and/or showing signs of failure.
59	Clogged Porous Pavement	By visual inspection, little or no water flows through pavement during heavy rain storms, usually causing ponding; clogging due to debris, organic matter and sediment.
60	Damaged Internal Walls (Sand Filter Media)	Internal walls are corroded, cracked, warped and/or showing signs of failure as determined by maintenance person.
61	Prolonged Flows (Sand Filter Media)	Sand is saturated for prolonged periods of time (several weeks) and does not dry out between storms due to continuous base flow or prolonged flows from detention facilities.

ID	Inspection Results	Definitions
V. Other		
62	Other	Inspection results which are not defined by one of the listed fields.